The Builder.

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Fifteenth-Century Italian Ornament.

EVERY ONE who looks at pictures at all must often have been struck with the elaboration and delicacy of the ornamental designs represented on the hangings and costumes in the works of the early Italian painters. Decorative design has, in the history of most art-producing peoples, preceded the power of expressive and true delineation of the figure; it has sometimes, indeed, been carried to the highest point by nations, such as the Japanese, who have never attained the art of drawing the figure at all except in a grotesque fashion. And in the days when the great art of painting, which was the glory of the Renaissance in Italy, was gathering strength and experience and knowledge for its future triumphs; when the figure was still portrayed with a tentative and laborious striving, still stiff in the joints and conventional in attitude, though the face was often eloquent with pathetic expression of a somewhat restricted kind; at this time the pictures painted were exuberant in carefully worked-out ornament, rich diapers covering the dresses of the figures and the drapery which hung around, so that even pictures which present little of life or interest in the figures often became highly interesting and valuable from a merely decorative point of view. The designs thus illustrated are often not only highly elaborate and effective in themselves, but further intricacy is added to the working out of them in the picture by the manner in which they are faithfully followed out by the artist through the folds and irregularly-twisted surfaces of the drapery on which they occur. This perspective treatment, so to speak, of the design, while it probably gave the artist an additional interest in his work, and added a problem of technique to the painting, is also a difficulty in the way of tracing and following out the design, should the spectator be sufficiently interested in it to wish to do so.

It occurred to Mr. Sydney Vacher, the architect who has produced the book the title of which forms the heading to this article, that if the various ornamental designs found in early Italian paintings, or in our National Gallery alone, without counting the riches of foreign galleries, were carefully copied, and in cases where they were obscured by the folds and perspective of the simulated stuffs on which they were delineated, were drawn out flat, like the map of the world on "Mercator's projection," they would furnish a new set of hitherto unedited Renaissance ornaments, interesting both for their intrinsic beauty and the circumstances under which they were found. Mr. Vacher has spared no pains in order to carry out this idea in a worthy manner, and the large folio which shows the result of his labour is one of the most sumptuous books of ornament that has been brought out for some time past.* Perhaps the effort to produce a volume *de luxe* is rather too apparent, for some of the ornaments which are on a small scale and are simple repetitions of one detail are drawn out all over a large page in a manner which shows their effectiveness certainly, but which occupies more space than is at all required to exhibit the design and construction of the decoration; and the work would have been of more practical and general utility if the amount of design in it had been compressed into a smaller and less costly book. However, this is only from the point of view of the general student, who will probably have the opportunity of consulting and studying the volume in libraries; and, apart from this, we have every appreciation of large and beautifully got-up books on a subject of this kind; there are not too many of them in England, and a beautiful book is an artistic treasure in itself of no mean order.

In his preface, Mr. Vacher suggests a practical utility in the publication of these ornaments, as many of them would be very suitable for reproduction on ordinary stuffs, such as curtains and other hangings, in a cheap form, and as an improvement on many of the patterns that are in use for such textiles. None of these designs, the author believes, have been published before; and some of the best of them occur in paintings that are hung rather high in the National Gallery, and having been glazed for protection, are thereby still more disadvantageously placed for close study, and the beauty of their decorative detail is consequently overlooked, or almost invisible to the ordinary spectator.

The hangings from which these ornaments are taken are mostly used in the pictures as backgrounds to the figures, or sometimes as drapery on a throne or seat, extending down the back and into the floor in front of the seat. Mr. Vacher raises the question whether these decorations were invented by the painters who used them in their pictures, or painted them from actual brocades. He inclines to the latter theory, as the shadows and folds in many of them are painted as if from actual drapery. Some of them, however, we are inclined to think, were inventions; the task would have been a very congenial one to the early Italian painters, so many of whom were decorators by profession, as much as painters of pictures. But where, as Mr. Vacher says, the patterns are carefully followed out in the deep folds of dresses and hangings, so that one has to look into the shadowed portion of the folds to trace out the combination of the design, it seems probable that they were painted from what was actually before the eye.

Of the thirty designs represented here in as many plates, not a single one illustrates that system of apparently natural growth and elusion of the idea of repetition which characterises so much of the later Renaissance ornament, and so much other fine ornament of different schools, and which has been carried to such a high point of perfection by Mr. Morris in many of his designs for textiles and wall papers. One or two, such as No. 10, from Crivelli's picture of the "Madonna and Child enthroned" (No. 807, National Gallery), or No. 11, from the same picture, present an appearance of intricacy at first sight, owing to the multiplicity of lines, but in reality they are seen to be based on the simplest geometrical arrangement. Some few of the designs given are merely powderings; a good many others are formed on a very simple basis, which Mr. Vacher describes as "a mesh formed of upward wavy lines drawn reverse ways, touching one another." Upon this simple theme, however, a great many variations can be played, as every ornamentist knows, especially with the help of colour. Others may be described as powderings, or repetitions of a small design filling a certain space, but placed so close as to cover the ground and fit into each other. These have an appearance of intricacy, but it is only a small but rather fully detailed design closely repeated.

The first two designs given are from Orcagna's "Coronation of the Virgin" (National Gallery, 569); the second is a repeating pattern of no very great character, but the first, in which bird-like conventional dragons (very like the dragons in Richard Doyle's pictures) are intermingled with a geometrical stem-and-leaf pattern in thin lines, is very delicate and effective, and just the thing to work in fine embroidery; it would require very patient work, however. The third design, from the same painting, a diaper of conventional flowers and groups of birds, gold on a purple ground, is much bolder in character, and looks, as Mr. Vacher says, very like an imitation of an actual textile. The expanded flowers, disks with rays, are very finely designed; the bird part of the pattern is rather feeble, and does not

* Fifteenth-Century Italian Ornament, chiefly taken from Brocades and Stuffs found in Pictures in the National Gallery. By Sydney Vacher, Architect. London: Bernard Quaritch. 1886.

blend well with the rest of the design. No. 4 is an example, from Fra Angelico, of another type of design, formed by the symmetrical spacing of sprigs of foliage not in themselves symmetrical. The effect of this is very pretty, though, regarded as design, it is disjointed and wanting in principle. A more vigorous and powerful design, on the same system, is given in Plate 30, a design in large conventional sprigs, very finely and broadly treated, from a drapery on the throne in the "Madonna and Child," by Vander Goes (N. G., 774). The charm of the Fra Angelico example is in the graceful design of the separate sprig; there is no contrivance or thought in it. In the plate following this,—No. 5,—we have one of the finest designs in the collection, taken from Spinello Aretino's "St. John the Baptist" (581, N. G.), where it is continued over the ground on which the figures stand. This is an admirable arrangement of birds and conventional flowers in such a manner as to form a continuous design, each portion appearing designed for its position in relation to the rest; the details are of great delicacy. The design is printed in warm yellow and white, and looks very charming (Mr. Vacher suggests that this and the succeeding one are probably copied from silk tissues, and they look very like it), but for the sake of avoiding too many printings, in other words for economy, two other colours are omitted; for in the original, Mr. Vacher tells us, the dark parts of the birds are black, and the ground has a red enrichment. As we are told this frankly, there is, of course, no misleading; but it is a curious kind of omission to make (and it is made in regard to two or three other examples —always duly noted) in what is intended to be an edition *de luxe*. The first luxury in a book on ornament is to show the ornament with the highest possible correctness and effect; to restrict the chromo-printing is exactly the wrong sort of economy; and if there had been a little less expenditure on the size of the book, the paper, and the binding "by Birdsall, of Northampton" (which is highly creditable to that artist), there would have been enough saved to give the full number of printings requisite to show this and some other designs in their entirety. It strikes us as a singular misjudgment to bring out a costly book of ornament and to economise in the representation of the ornament itself, which is, after all, the ostensible *raison d'être* of the book. This only applies to a few of the plates, but it is impossible to pass the fact without comment.

The two most remarkable designs next in the book are the two very elaborate ones, Nos. 10 and 11, which we have already referred to, from Crivelli's "Madonna and Child" (N. G., 807). These show, as the author says, a very unusual form of ornament, little illustrated; No. 11 especially, formed entirely in white lines on a dull red ground, is an admirable design, and suggests a great deal of varied application of the same method. Plates 12 and 13, from two other Crivellis (N. G., 724 and 739) are examples of ornament designed on the same principle, though not quite equal to No. 11. The fact of this special and unusual form of ornament recurring in Crivelli's pictures seems to us to indicate that it was his own special design, and not a copy of existing textiles or other ornaments. With the next plate we come on a series of a different class, large and open geometrical forms, filled in with very highly conventionalised foliage. Crivelli shines in this class also, which is a principle of ornament much more common, and prevalent in many modern wall-paper designs; one of his, white flowers on an arabesque pattern in two tints of red, is very fine and powerful. Another of Crivelli's, plate 15, black and dull yellow sprinkled with gold, may be noted as very effective. Another very fine one, of a much broader and bolder type, plate 21, is again by Crivelli, who, in fact, contributes a great deal of the artistic value of the book; this latter is from a Madonna (No. 788, N.G.). A very unusual and brilliant one from Matteo di Giovanni follows (plate 22), from the mantle of the Virgin in an "Assumption" (1,155, N.G.). The ground of this consists of a series of panels with scroll edges, in light grey, so designed that the white interspaces form a complementary pattern of similar character; the centres of the grey spaces are filled with a very pretty flower seen on plan, the four cardinal petals symmetrical (we suspect meant to be in gold, but not so printed), the intermediate petals very playfully treated in three colours, varied *ad lib*, the arrangement following no fixed order. The author observes that there is a pattern very similar to this in the South Kensington Museum. The only two others we can mention are another very fine Crivelli ornament, black and yellow, the black predominating, from the "Madonna in Ecstacy" (906, N. G.), and a very original and artistic pattern from the coat of a figure in a picture ascribed to Durick Bonts (783, N. G.). This is an arrangement of unsymmetrical red sprigs on a white ground, with a broad five-pointed flower filling the spaces, the whole interlocked so as to form a symmetrical and continuous pattern.

We have to thank Mr. Vacher for a book which contains abundant material for suggestion to decorative artists, and which is in itself, despite the one defect we have alluded to, a charming work of art and a great ornament to an artistic library.

THE REVISED DRAFT CHARTER OF THE INSTITUTE.

THE proposed new Charter, as revised by the Committee, has now been circulated to members of the Institute, signed by twenty-six members of the Committee, and with a protest and an alternative draft signed by four dissentients. The nature of the alterations which have been made from the first draft is thus described in the preliminary remarks attached to the draft by the Committee:—

I. The clauses relating to the Council have been reduced in number, and simplified.

II. The control of general meetings has been specifically defined, and made absolute.

III. The proposed submission of new By-laws to the Privy Council has been rescinded.

IV. A provision respecting "Branches" of the Royal Institute has been added.

V. The power to hold Examinations has been extended to the Provinces, Colonies, Dependencies, &c.

VI. The preamble of the proposed Charter has been modified.

In regard to points I. and II., the absurd clause providing that the Charter should state who the first President and Council under it should be (Clause 25 of first draft) has been omitted; another (28) which gave the Council liberty at any meeting of at least five members, "to exercise all the powers of the Royal Institute," is struck out, as also the remarkable clause (35) to which we before adverted, which rules that though the Council are subject to the control of the general meetings, any act previously done by them should not be invalidated by a subsequent resolution of a general meeting. It is not surprising that these two clauses should be struck out; the wonder is that they should ever have been seriously proposed. Taken together, they would have enabled any meeting of five out of the Council to have done whatever they pleased, without reference to the general body or the rest of the Council! The clause (32) which gave the Council power to apply funds in certain cases for the maintenance of Prizes, Medals, Studentships, &c., is also omitted and left to be dealt with by By-laws; and another clause relating to the application of funds has had the phrase "subject to the control of general meetings" inserted. Emendation IV. merely gives the power to frame by-laws in relation to "branches" of the Institute. On this head Mr. Holden suggests in a note that to the words, "the relations of the Royal Institute to such branches thereof as may be established within the United Kingdom, or its colonies, or its dependencies" should be added the words, "or to such other societies as may be already existent." This would leave the way open for any steps towards that federation or affiliation of provincial societies which in some form may be possible and desirable. The modification in regard to the preamble consists in incorporating in it a paragraph which in the first draft formed part of clause 38, providing for the making of new by-laws and the management of the affairs of the Institute during what might be called a period of transition. In the preamble also the Gold Medal is defined as given "for the promotion of architecture," instead of "to such distinguished architect or man of science as may have," &c., &c. The sole merit of this alteration is brevity; otherwise it appears to be vague and ill-expressed. On whom or what is the medal to be conferred; and what is the meaning of "the promotion of architecture"? The paragraph was a great deal better as it stood before; it meant something definite then; it means nothing intelligible now.

The preamble of the Draft Charter is rather lengthy, but it is well to have the position clearly defined. The succeeding clauses as they now stand appear to us to be in the main satisfactory; there are, perhaps, still one or two points unnecessarily incorporated in the Charter with which by-laws might have dealt, such as the clause providing that every member should have a right to ask for a certificate of membership. This may or may not prove a necessary or a popular provision; it seems more a case for a by-law. Otherwise, we do not see that there is anything in the Charter as now proposed which is unsuitable.

The four dissentients referred to are Professor Kerr, Mr. Wyatt Papworth, Mr. Lacy W. Ridge, and Mr. Gough. They appear to be in rather "a temper" with the main body of the committee, and complain that they were called "delegates" and not "colleagues." The appointment of the members outside the Council certainly appeared to us to be made in the former sense. The draft was, at the meeting of November 30, returned to the Council for consideration, with the assistance of certain outside members appointed to represent each class of members in considering the revision. The minority object that a number of matters have been incorporated in the Draft Charter which ought to be dealt with under by-laws (in which we do not concur), and they then embody in their own draft the provision that members should have power to vote without personal attendance,—a matter which, of all others, ought to be left to an elastic by-law, inasmuch as it might prove very inconvenient or undesirable, and to fix it for ever by a Charter would be most unwise. But whilst proposing to pin the Institute for ever to this detail, they are so cautious in other respects as to guard their provisions for the election and powers of the President by the saving parenthesis "if any," and the Vice-Presidents the same. What occult ideas they have as to the future possible constitution of the Institute which can render such an eccentric provision necessary, they know best; but, to our thinking, the very interpolation of such a provision shows that their alternative document is one which it would be hardly worth while to take seriously.

Lectures for Sanitary Inspectors.—The Council of the Parkes Museum are making arrangements for a special series of lectures to inspectors of nuisances. The various subjects with which these officials ought to be acquainted will be dealt with in a course of twelve lectures, and the co-operation of several well-known authorities to deliver lectures in their own departments has already been secured. The course will be repeated twice a year to suit the requirements of persons preparing for the examinations of the Sanitary Institute of Great Britain, and will comprise all the subjects scheduled for that examination. It is believed, however, that the course will have a further use in supplying the wants of acting inspectors and of other persons desirous of obtaining a practical acquaintance with the working of sanitary laws and regulations. The lectures will be given in the Parkes Museum, 74A, Margaret-street, Regent-street, W., and members of the class will be granted the use of the reading-room and extensive library, a catalogue of which is on the point of completion. The dates of the lectures will be advertised shortly.

NOTES.

THE debate on Tuesday last on the payment of interest on capital during the construction of the Manchester Ship Canal resulted in a foregone conclusion. After the recommendation of the Board of Trade that the application should be allowed, it was scarcely possible to doubt what the result would be. We confess, too, that the motion to reject the Bill by one of the members for Liverpool, and the general character of the opposition, namely, to delay or harass the undertaking by a side blow, was scarcely calculated to draw many adherents to the side of Liverpool. We have always been sceptical as to the success of this undertaking, and the apparently absolute necessity which the promoters are in to be allowed to pay interest out of capital in order to enable them to raise the eight millions required, does not promise much for the success of the enterprise. We confess that it seems to us doubtful whether the payment of four per cent. interest during construction is sufficient to induce investors to lock up their money in a very speculative enterprise. Tramway companies and similar bodies promise investors six and seven per cent. during construction, which is obviously a different bait from four per cent., which can be obtained from investing in numerous investments, of which it may fairly be said that they are reasonably safe.

ON Tuesday night the House of Lords read the Code of Arbitration Bill a second time. It is always satisfactory to see a practical branch of law reduced into an intelligible shape, and there are so many laymen engaged one way or another in arbitrations that it will be advantageous to them to have the law relating to arbitrations in the same clear form that they are now able to peruse the law of bills of exchange and promissory notes. There is much sense in Lord Bramwell's observation that, when a layman is in any real difficulty about an arbitration, he will seek the advice of a lawyer, and not go to the code. But architects and surveyors who have acted as arbitrators must have frequently wished to have the law presented to them in a clear form, and in a reasonable compass, even for their information on general procedure, and this is what the Code of Arbitration Law will do for them.

THE best point made in the address of Mr. Johnson, Secretary of the National Refuge Harbours Society, on the occasion of the deputation to Mr. Mundella, on Wednesday, was in regard to the opportunity which such works, if undertaken without delay, would give for employing labour at present in useful work on a large scale. We observe, however, that the deputation did not, according to the newspaper reports, make any specific suggestion as to points where harbours were most necessarily and immediately required. To bring the subject into a practical form in regard to the employment of labour during the present bad times, something more definite than a general recommendation to construct harbours was needed. The subject is undoubtedly of great practical importance,—we have urged it before; but we doubt whether the society which has taken it up is very judicious or forcible in its advocacy. We subjoin part of Mr. Mundella's reply, as giving the *per contra* of the subject:—

"He was happy to be able to assure the deputation that the loss of life in the fishing industry on the coasts of the United Kingdom had diminished of late years, and it was a matter of great satisfaction to see that while the trade was increasing, the danger with which it was attended was decreasing. Several of the speakers had referred to the relief which such works as were proposed would afford to the unemployed. But the expenditure of 3,000,000*l.* annually on harbour works would only allow the employment of about 20,000 men, and, in order to give employment to 100,000 men, an expenditure of about five millions in wages and a million and a half on other items would be necessary. As to her expenditure on harbour works, England compared favourably with other countries, since we had expended more under this head than all the countries of Europe."

ONE more scheme for the disposal of the sewage of the Lower Thames Valley has been issued. It is that of Messrs. Kinipple & Morris, MM.I.C.E. In a report which they have submitted to several of the authorities in the Thames Valley, they describe what is designated a "divided" and a "combined" scheme. Under the former scheme the parishes of the Lower Thames are divided into three divisions as follow:—First division: Barnes, Mortlake, Kew, Richmond, Petersham, and Ham. The estimated cost of the works for this division is 199,614*l.*, with an annual expenditure of 11,410*l.*, equal to 9d. in the pound. The second division consists of Kingston, Surbiton, Maldon, Hook, Long Ditton, Thames Ditton, Esher, East and West Molesey, Teddington, Hampton, Hampton Wick, and Sunbury. The cost of this division is estimated at 277,430*l.*, with an estimated annual expenditure of 16,757*l.*, equal to 8¾d. in the pound. The third division includes Walton, Weybridge, Addlestone, Chertsey, Upper and Lower Halliford, and Shepperton. The estimated cost of this division is 55,411*l.*, with an annual expenditure of 3,227*l.*, equal to a rate of 4¾d. in the pound. It is not intended to make in each division a complete system of sewage disposal, with intercepting-pipes, pumping station, and precipitating-tanks. Each division, however, would have its own intercepting sewers and pumping station, from which the sewage from each division would be pumped to central precipitation works, where the whole of the unclarified sewage would be treated. The scheme proposes to filtrate the effluent water through land before it passes into the Thames at a point just below Teddington Lock, thus complying with the recommendations as to filtration made by the Royal Commission on Sewage Disposal. The site for the proposed precipitation works is on the River Wey, near the Basingstoke Canal; the directors of which, it is stated, are willing to take a certain sum for the absolute freehold right of the canal. The distinguishing feature of the combined scheme is that instead of three cast-iron main intercepting pipes there would be only one, conveying the whole of the sewage to the precipitation works. This combined scheme is estimated to cost 499,153*l.*, including the cost of the canal and the land. The annual expenses of maintenance would be 28,971*l.* On a rateable value of all the towns and districts included in the scheme of 926,241*l.* a rate of 7½d. in the pound would be sufficient for these annual expenses.

THE House of Commons have come to the same conclusion in regard to the proposed Bill for constituting the Metropolitan Board of Works a general opposing counsel against Water Supply Bills which we suggested two or three weeks ago,—that it is no part of the function of the Board to expend the ratepayers' money in such an object. The "Metropolitan Board of Works (Water Supply) Bill" was accordingly thrown out on the second reading by a majority of 130 against 76.

IT has been determined to erect a monument near the entrance to Prospect Park, Brooklyn, in honour of the soldiers who fell in the war of the Revolution, the Mexican War, and the last Civil War in the United States. The model which has been accepted is designed by Mr. Richard M. Hunt, and the sculptor who has been commissioned to execute the work is Mr. J. Q. A. Ward. The height of the monument, when completed, will be about 80 ft., and it will be constructed almost entirely of granite. The shaft forming the principal portion of the monument is to consist of two granite drums, not less than 16 ft. in diameter, standing together 32 ft. in height. There will be a base beneath them about 48 ft. in diameter, erected upon a circular platform 120 ft. in diameter. The latter is to be surrounded by a balustrade with four openings, approached from each direction of the compass by a flight of steps. The group surmounting the central shaft will represent an angel of peace, holding the olive branch in her hand and separating two combatants at her feet. Beneath, on the exterior of the shaft, will be inscribed the names of the most important battles in which Brooklyn soldiers had distinguished themselves. On the base of the shaft will be bas-reliefs, illustrating the departure for, and return from, the war; and the work executed by women during the various battles, as well as the conflict between the *Monitor* and *Merrimac*. Four abutting pedestals, each supporting an equestrian figure, are to be placed around the base. These figures will represent Grant, Washington, Scott, and Jackson respectively. A series of four oblong pedestals, which are to support colossal figures, will stand on the chief platform, being partially enclosed by the balustrade. These figures are intended to represent a Zouave resting, with his rifle betwixt his knees; a sailor, holding a telescope in one hand and shading his eyes with the other hand; a dismounted cavalry-man, kneeling on his saddle, his sabre broken, and armed with a pistol; lastly, an artilleryman, seated on a cannon, and grasping a rammer in one hand. It is calculated that the project will occupy at least five years to accomplish, whilst the cost is estimated at between 500,000 and 600,000 dollars.

WE have received a second "monograph of American Architecture" in the shape of a portfolio* of reproductions by the Heliotype Printing Company of a series of exterior and interior photographs of "the State Capitol, Hartford, Connecticut," of which Mr. Richard M. Upjohn is the architect. Plans of three floors are added. The building is a rich and costly one, and appears to have been worked out with care in all the details; but we do not find here the genius and originality which struck us so much in a former similar monograph of the Harvard Law Schools by Mr. Richardson. The style is Gothic, of an effective but unrefined type. Ornament is overdone and too lavishly introduced; and it is not "ornament of a meek and quiet spirit" by any means, but very self-asserting. Large, lumpy crockets stick out from little gablets, giving them a ragged outline; windows are cut into heavy angular plate-tracery; shafts are placed standing far out from the walls on corbels, and with very big foliated capitals to carry statues which do not appear to be forthcoming. The design is what English Gothic architects (the best of them) would certainly regard as vulgar. If this is to be regarded as a typical modern Gothic design in the States, they have not caught the spirit of it in those regions yet. The plan is an effective one, but seems very lavish of space in entrance-halls and corridors, in comparison with the whole area of the building. As an example of recent American architecture, the design is very disappointing in comparison with its predecessor in the "monographs."

IN reference to the Sunderland Municipal Buildings competition the Secretary of the Northern Architectural Association has addressed the following letter to the Town Clerk of Sunderland:—

"*Newcastle-on-Tyne*, February 10th, 1886.

"Sir,—The attention of the Northern Architectural Association has been called to an advertisement appearing in the daily press inviting plans for the new municipal buildings.

They would feel very much obliged if you will kindly inform them if a professional assessor is retained to adjudge the plans sent in.

I enclose a series of recommendations for regulating the conduct of architectural competitions, published by this Association, which have been sent to and adopted by other corporations under similar circumstances.

Perhaps you will be kind enough to lay it before the Town Council of Sunderland, and we hope they may see their way to adopt the recommendation in this case.—Yours faithfully,

FRANK W. RICH, Hon. Sec."

In view of the importance now attached by architects to the employment of professional advice in deciding competitions, and the fact that a large proportion of the profession have signed an undertaking not to compete except on the understanding that such advice will be

* Published by Messrs. Ticknor & Co. in Boston, and Messrs. Trübner in London.

obtained, we think it well to make public the fact that such a request has been made to the promoters of the Sunderland competition.

A GOOD deal is expected of Borough Surveyors in comparison with the salaries offered them. We have before us a circular from the Corporation of Eastbourne defining the qualifications and duties for candidates for this office under the borough. The surveyor must "be properly skilled and educated in the art or practice of building" (which is it, an "art" or a "practice"? Probably they mean "theory *and* practice"); he must hold a certificate from the Royal Institute of British Architects, or the Institution of Civil Engineers, or "the Institute of Sanitary Engineers" (*sic*), and "devote the whole of his time to the duties of his office, and not engage in any business, profession, or occupation, either for profit or otherwise"; and he is offered a salary of 156*l.* a year and an office (not a house). Not a brilliant prospect, certainly.

A CORRESPONDENT sends us one or two notes as to the results of competitions without the intervention of professional advisers in the case of two recent Board School competitions. In one case we find architect's estimate, 1,600*l.*; lowest tender, 3,670*l.*; total final cost, about 4,000*l.* In another case architect's estimate 4,500*l.* to 5,000*l.*; lowest tender, 8,840*l.*; total cost after sundry law expenses (we are not told what these amounted to), 10,130*l.* A very practical form of argument in favour of employing professional advice in the choice of plans.

THE Governors of the Charterhouse have appointed Mr. R. H. Carpenter, who is an old Carthusian, as architect for whatever alterations are necessary: an appointment which is a guarantee that there will be as little as possible destruction of the ancient work. Sir R. E. Webster will take charge in the House of Commons of the Bill in relation to the powers of sale and reconstruction sought by the Governors.

MR. SHAW-LEFEVRE has endeavoured to throw whatever weight on such a subject may attach to his name against the Institute of Architects' scheme for improving the treatment of the site for the War and Admiralty Offices, in a letter to the *Times* of Friday in last week. His objection, as stated, is solely on the ground of economy. His estimate of the increased expenditure which the Institute scheme would involve is very much over the mark, as Mr. Robins conclusively showed in a subsequent letter to the same journal. That Mr. Shaw-Lefevre is not alive to the architectural advantages to be gained might be expected from what he has shown us of his perceptions on that subject in connexion with this and other matters in which he unfortunately obtained far more of his own way than was for the architectural benefit of London. Any one who could deliberately support as adequate such a way of placing a great public building as that proposed by the Government for the War and Admiralty Offices must be very badly endowed with æsthetic sense. It is some satisfaction, however, to observe that Mr. Shaw-Lefevre's architectural lectures in the *Times* in favour of his own ideas are now apparently to go under his own name.

The Architect's Department, Metropolitan Board of Works.—At the meeting of the Metropolitan Board of Works on the 5th inst., the Clerk presented a communication from Mr. Vulliamy, the Superintending Architect, with reference to his absence from the office in consequence of the state of his health, requesting, in accordance with the Act, that during his absence Mr. Hebb, the Assistant Architect, may be appointed as his Deputy in all matters connected with the Building Act Office, and Mr. Goddard, Surveyor and Valuer, in all other branches of the Department. This was agreed to. We regret very much to hear of Mr. Vulliamy's continued illness.

LETTER FROM PARIS.*

WILL the centenary exhibition be national or international? is the question now suggesting itself to the public and to the Government. The latter has opened some rather injudicious *pourparlers* on a matter which requires a prudence, tact, and adroitness of which French diplomacy, unfortunately, has no longer the secret. Some proposals, made late in the day, have been met by foreign Governments with a reserve which is not re-assuring. However it may turn out, it seems now to be understood in high quarters that the time for action has arrived; and M. Lockroy, the new Minister of Commerce, seems animated by abundance of zeal, of which we shall, no doubt, see the first result before long. Possibly by the time these lines appear, the Chamber may have already formulated the law to regulate all the financial questions in regard to the Exhibition of 1889. It is unnecessary to add that now the candidature of M. Antonin Proust for the duties of Commissary-General appears entirely put aside. That political sinecure will be well replaced by an executive committee, in which M. Alphand will be called on to occupy a prominent position, a fitting culmination of his active and useful career. A commission of control will be attached to that committee, and the municipality of Paris will be called upon to furnish a part of the guaranteed fund for the work, about eight million (francs) out of 40 millions; 12 millions will be granted by the State, and the rest furnished by a financial society. The matter is, therefore, entering on a new phase, and we shall, no doubt, have some further information to give in our next letter. It now only remains to say that a petition has been addressed to the Government by a great number of architects praying that the design and construction of the Exhibition may be open to competition. This request, signed by many well-known names, has been laid before the Ministry by M. Clémenceau. This question deserves serious consideration if the Exhibition is to have a character of grandeur and originality and to rise above the ordinary commonplace of exhibitions, and make us forget the bad architectural taste of that of 1878.

To come from this great exhibition to smaller ones of immediate interest, that of the Water-Colour Painters is, as usual, the most brilliant and the most frequented of the smaller exhibitions which are rife at this time of year, though less so this year than on some previous occasions. This year there are some new recruits, whose talent does not make one forget the absence of so many old members. De Neuville is no more; Detaille and Cazin do not exhibit; the infirmities of age have kept Eugene Isabey's pencil idle. But Lamy, the valiant octogenarian, is always there, younger and abler than ever. We may note one or two of the new comers; M. Boutel de Monvel, who imitates pleasantly the style of modern English art; MM. François Flameng, Gilbert, Morot, and Albert Besnard, an impressionist who employs all possible means, good or ill, to make us forget his academic origin. We might speak also of the exhibition of the Mirlitons, or that of the Cercle Volney, but not with many compliments. This art of the club has the serious fault of smothering a few fine works by real painters among the commonplace efforts of amateurs, who make art a pastime, who are applauded by a kind of fashion, and whose works remain at the same level year by year.

As to the "Union des Femmes Peintres et Sculpteurs," which holds its annual exhibition at the Palais d'Industrie, I prefer to pass over in silence an exhibition of utter insignificance, if one excepts the marine paintings of Madame Lavillette, a good enough painting by Madame Annie Ayrton, and a pretty statue by Madame Léon Bertaux.

Formerly, when an eminent artist completed a work, he invited his friends to advise and criticise quietly in private before exposing it to the public. We have got beyond that now; the jaded palate requires a more sensational first exhibition. Thus we had the other day the "private view" exhibition of a sensational painting of the "death of a great composer," accompanied by a concert of sacred music intended to render more complete the nervous impression on the organism of the public. Under a carefully-prepared half-light the spectators seemed to see the form of Mozart extended on a couch in the pallor of death, while from behind the canvass were heard the strains of his "Requiem." This carefully-arranged effect was too much for more than one fair "mondaine," whose lace handkerchiefs were moistened with their tears. Was it the music or the painting? This attempt has been succeeded, at the establishment of a well-known picture-dealer, by another on a larger scale, but not less carefully prepared. We advance through a series of galleries to the Holy of Holies, where the work is unveiled to the pious gaze of the faithful in a mysterious and theatrical light. There will be further developments of this scenic contrivance, no doubt; and the good public runs after it with avidity. It is a suitable amusement for the Parisian "snob," whose name is legion, but it is a charlatanism unworthy of art. Munkacsy has no need of this kind of *mise en scène*, and why select it for his last work especially, which is certainly inferior to many preceding ones? The principal figure, that of Mozart, is poor and expressionless; the surrounding figures are mere commonplaces copied from models. The exaggerated praise lavished on this work only draws attention to the comparative failure of a painter whose real powers we admire too much to pretend any great admiration of this his latest effort.

We much prefer the modest exhibition of the works of a Viennese landscape-painter, M. Otto de Thoren, in the Rue de la Paix. There is here no pretension, but true artistic excellence, a genuine appreciation of nature, and some out-door studies from animals executed with great truthfulness; and true art can stand on its own merits without the assistance of the picture-dealer's artifices of effect.

While the exhibition of the collected works of Baudry, which will open in April, is in preparation, there are several candidates for the succession to the post held by the great artist at the *Institut*. M. Puvis de Chavannes, who had been named as the successor, declines to come forward, and the contest remains between MM. Henner, Gustave Moreau, Jules Lefebvre, T. P. Laurens, and Jules Breton, of whom the latter has probably the best chance. M. Paul Dubois, the sculptor, we may here mention, has offered to execute gratuitously the monument to be erected to Baudry at Père Lachaise, on a site granted by the municipality.

Our permanent museums, as has been observed, have been undergoing important alterations. The enlargement of the Musée de Cluny, where one of the courts has been transformed into a gallery for glass exhibits, is completed, and it is hoped that the new Luxembourg will be opened to the public this month. The placing of the works of art is nearly accomplished, and the exterior sculpture of the new façade is in process of completion, but the work has been very long in hand. The State adopts a cautious delay in matters of this kind; witness the Porte St. Martin, which has for whole months disappeared behind scaffolding, and of which the restoration has not yet commenced. M. Asbach has, however, been commissioned to restore the statue of "The Rhine." That of "Holland," which has suffered so much, has been confided to M. Gaudez. MM. Pezieux and Desbois are to occupy themselves with the groups of lions, while M. Mattieu Meusnier will undertake the bas-reliefs. All is ready, and the work might be very soon done. The Government might take example from the Railway Company "De l'Ouest," which is pushing on the new works at the St. Lazare Station with great energy. There is here a large building yard in very full occupation; the buildings are rising fast, and the service to the suburbs should be open to the public at the end of this year. The architects have, nevertheless, encountered serious difficulties. As in the case of the construction of the Opera, there is a subterranean piece of water to contend against on the site of the ancient Grange de Batelière; deep pits had to be dug and foundations carried down, for which reason the façade to the Cour de Rome has been seven months in rising above the ground. However, now the old houses in Rue St. Lazare will be soon demolished, the Rue d'Amsterdam widened, and passengers arriving from England will find, in the very heart of Paris, a vast and commodious station with a terminus hotel situated near the promenades, the theatres, and other main objects of interest in Paris.

The work at the Pont Neuf is being carried

* Deferred from last week for want of space.

on diligently. All the upper portions which have shown signs of weakness have now been removed, and the foundations are now being dealt with by the aid of caissons. Towards the end of the month the demolition will be complete, and the work of reconstruction will commence, which will probably occupy the rest of this year.

In the way of new constructions mention may be made of the barracks for the "sapeurs-pompiers," which is to be inaugurated on the Boulevard Diderot. The organisation for fire-extinction in Paris, long in a very stationary condition, has recently been the object of much attention on the part of the administration, which has obtained from England, Holland, and the United States information as to the most recent improvements. The barrack building is a model of its class. In the principal building, intended for the officers, and the façade of which is adorned by a fine bas-relief by M. Roty, there is recorded, on a marble tablet, the list of firemen who died in the execution of their duty. This list already includes seventeen names, among them that of the sapeur Havard, who was burned in the conflagration of the Magasins du Printemps, and that of Colonel Troidevaux, who perished in 1882, a victim to his devotion. Beside this is the telegraph-room communicating with all the postal telegraph stations. As soon as a fire is signalled, the telegraphist has only to press a button and the alarm-bells sound, the doors of the fire-engine houses open automatically, the gas is turned up at the same moment, and the engine is ready to start in one minute. There are special apparatus for enabling the men to slide from their dormitories into the engine-house, a high tower which serves for gymnastic exercises, and a basement with wells attached where the men are to go through a drill in the operations of fire-extinction and rescue of property. All the details have been carefully studied by the architect, M. Roussé, who obtained the commission in a public competition, and has given his mind to the consideration of all requirements and all the recent improvements in connexion with the objects of the service.

The bust of the celebrated historian, Henri Martin, was recently inaugurated in the Mairie of Passy. It is the work of M. Marquet de Vasselot, whose statue of Lamartine, now in the founder's hands, will also be erected towards the end of April. Without contesting the honour paid to the memory of Henri Martin, it was going further than necessary to re-name after him the "Avenue de Trocadéro," the title of which belonged properly to its situation. These changes of names cause a great deal of public inconvenience.

A few days before, a similar ceremony took place at the College of France in honour of Claude Bernard; and in the last week in February was celebrated the centenary of Arago. The ultra-republican section of the municipal council declined to take part in this because Arago, when Mayor of Paris in 1848, refused to make any compact with the insurrection. It is to be hoped the council will be less severe in its views in regard to Admiral Courbet, whose statue it is proposed to erect in the Square Montholon. Nevertheless, if circumstances had given the gallant admiral a military command in 1871, there is no doubt he would have employed all the rigours of repression against the Communists. The execution of the monument to the admiral has been confided to MM. Falguière and Mercié, with the assistance of M. Pujol as architect. There is soon to take place also the inauguration of the funeral monument to Berlioz at Père Lachaise, and (in the Parc de Monsouris) that of the fine work by M. Mercié, entitled "Quand Même," a reproduction of the original erected at Belfort. The same artist is completing the model for the statue of Victor Massé, the composer, intended for Morbihan. It is a fine work and a striking likeness.

The same cannot be said of the greater part of the busts which adorn the Institut, and are intended to perpetuate the features of eminent men who have done honour to France. These busts are mostly below mediocrity, and the Académie des Beaux Arts has entrusted a committee of artists with the duty of weeding out such as are unsatisfactory either in an artistic point of view or as likenesses.

There have been fresh gaps in the artistic ranks since our last. We may record specially the death of M. Emile Lafon, pupil of Gros & Delaroche, two of whose pictures are in the Luxembourg, "Jesus disputing with the Doctors" and "John the Baptist recognising Jesus." Lafon was 68 years of age.

The sculptor Loison, who has also died recently, was about the same age. Born in 1820, he had followed with success the teaching of David d'Angers. Among his principal works may be cited "Phryne," "Daphnis," "Chloe," "Pandora," "History" (a marble group), the bust of Berryer which figures at the Institut, and various statues in stone at the churches of La Trinité, St. Ambroise, &c.

A RELIC OF WREN'S WORK: LONDON.

THE COLLEGE OF PHYSICIANS.

"There stands a dome, majestic to the sight,
And sumptuous arches bear its oval height;
A golden globe, placed high with artful skill,
Seems to the distant sight a gilded pill."
Garth's Dispensary.

AN enclosed and forgotten fragment of Wren's handiwork has lately been exposed to view. An extensive range of new buildings is in course of construction along the western side of Warwick-lane. The ground to be covered lies between Warwick-square and the back of Newgate-street. Between this ground and Newgate Prison stand the foundries and show-rooms of Messrs. J. Tylor & Sons. Their principal block of workshops is conspicuous for its high tower, which soars above the prison shaft and the Holborn valley below. Immediately northwards of this block are the show-rooms and offices, embodying, in parts, all that is now left of the old College of Physicians. The eastern façade of this remaining fragment will soon be again lost to sight. The Royal College of Physicians derive their foundation from certain meetings which were held at his residence in Knightrider-street, by Dr. Linacre, physician to kings Henry VII. and Henry VIII., and the friend of Erasmus, Latimer, and Sir Thomas More. The members subsequently migrated from Linacre's house, which they had inherited under his will, to more commodious premises by Amen-corner,—these ever memorable for the lectures that Harvey delivered therein upon his own great discovery, and for which he used some preparations that were religiously preserved after his death. Harvey, as did John Hunter in Leicester-fields, built for himself a museum adjoining to the site of the existing Stationers' Hall. But the college, the museum, and the earlier Stationers' Hall were destroyed by the Great Fire. The physicians, having assembled during the interval at their President's house, next went to the new College which Wren had built for them in Warwick-lane. Those buildings (finally completed in 1689) included a hall, dining-room, lecture-theatre, and library; together with a large octangular porch, entered from Warwick-lane, carrying the dome and its golden ball, which Garth commemorates in his "Dispensary." Pennant records that "on the summit of the centre" was fixed the bird of Æsculapius,—the admonishing cock. The amphitheatre gained well-deserved praise for its plan and proportions, both being admirably adapted to the purposes it should serve. The interior doubtlessly supplied to Hogarth a background of plate iv. of "The Stages of Cruelty."* According to D. Loggan's print of 1684, and certain invitation-tickets of later date, the court's western, and principal, side consisted of two lofty stories, surmounted by an attic-floor. Above the central pediment rose an octagon tower, in two stages. This tower, with columns at its angles, closely resembled that of Wren's existing church of St. Michael Paternoster Royal, on College Hill; whilst its lantern, carrying a vane, and the cock mentioned by Pennant, was like to that of Wren's church of St. Michael Bassishaw. The relic of which we speak presents, as viewed from the east, the two lofty stories, these being after the Classic model, and having no balustrade. Of its two orders the upper is Composite, the lower is Ionic. The pilasters, one above the other, support entablatures. In the middle intercolumniation were a niche, and the great doorway, gained by steps. The other corresponding spaces were pierced for windows. The upper range of single windows,—high, narrow, and round-headed,—have unusually large and far-projecting ornamented keystones or bosses. The windows below are square: each of the several pairs is separated, vertically, by a hanging festoon. The row which corresponds to them, to the west, forms, in part, a dividing wall in Messrs. J. Tylor & Sons' premises. The fragment comprises three whole bays, or divisions, together with a fourth, which latter is broken. The broken division and the one next thereto are slightly in advance of the two others. King Charles II.'s statue occupied the niche over the door; Sir John Cutler's stood opposite to this in the western side of the Warwick-lane main entrance. These two statues, of heroic proportions, we last saw in the vestibule of the City Museum, Guildhall. Cutler's statue possesses a singular history. It was voted for, in 1680, by the Fellows, fervid with gratitude for what they conceived to be a munificent gift by Cutler in aid of the new fabric. At the work's completion, they borrowed from him an additional sum. In 1699 Sir John's executors made a demand for 7,000*l.*, as including the recognised loan, and the pretended donation,—but set down for a debt in his own books,—with interest charged upon both amounts. In the result, Lord Radnor and one Mr. Boulter, the executors, accepted 2,000*l.* from the College, remitting the balance. In compliment to them, the Fellows did not disturb the statue, but marked their sense of Cutler's conduct by effacing the inscription which they had written beneath his figure:—

OMNIS CUTLERI CEDAT LABOR AMPHITHEATRO.

The library was furnished with books by Sir Thomas Mayerne, a native of Geneva, and physician to James I. and Charles I. The Marquess of Dorchester added to Mayerne's collection. The amiable Sir Samuel Garth caused Dryden's body to be conveyed to the College Hall. There it was honoured with a solemn performance of music, previously to the funeral, which was largely attended, in West Minster. On June 25th, 1825, Sir Henry Halford, who had examined the remains of King Charles I. at St. George's Chapel, Windsor, *coram* the Prince Regent, delivered the customary Harveian oration, in Latin, to celebrate the opening on that day of the new buildings. These were erected by Sir R. Smirke, R.A., at the corner of Pall Mall East and Trafalgar-square. The amphitheatre, together with certain other parts of the old edifice, returned awhile to the base uses of Newgate Meat Market. The entrance gateway and dome survived until about twenty years since. In the Crace Collection are two tickets, of dates 1721 and 1725, inviting Dr. Stukeley to a lecture and meeting respectively; whereon the President, Thos. Parkins, asks his "Excellency" to attend "*cum pileo et togâ.*"

* Originally sold in 1751, price 4s. the set. Hogarth had published, January 1st, 1750, the subjects of plates iii. and iv. from wooden blocks, on a larger scale.

ARCHITECTS' BENEVOLENT SOCIETY.

ANNUAL MEETING.

THE thirty-sixth annual general meeting of the subscribers and donors to this society was held on Wednesday afternoon last in the Meeting-room of the Royal Institute of British Architects, Conduit-street, Mr. Ewan Christian, President, in the chair.

Mr. W. H. White, the Honorary Secretary, read the annual report, which stated that the Council, during the last twelve months, had held five meetings, at which they had distributed the sum of 580*l.* 5s. among thirty-four persons,—identically the same number as in 1884–85,—and had paid one pension of 20*l.* The Council were glad to be able to state that the number of annual subscriptions to the Society had increased, though the amount received in donations (which were carried invariably to the capital account, and, in due course, invested) was less than it had been for the last six years, partly because of the absence of legacies such as those which were bequeathed to the Society in 1880, 1883, and 1884, by Mr. Edwin Nash, Mr. T. H. Wyatt, and Mr. David Mocatta. The contributions from Corporations or Societies had been few, namely, twenty guineas from the Worshipful Company of Carpenters (which was a renewal of their gift, to a similar amount, of the preceding year); ten guineas from the Architectural Association of London; ten guineas from the Nottingham Architectural Association; and, as in former years, the income of the small charitable fund pertaining to the Royal Institute of British Architects had been paid to the Society's account. A desire to see the funded property of the Society increased was still evinced by a few benefactors. At the present time it consisted of a sum of 4,200*l.*

London and North-Western Railway Four per Cent. Debenture Stock, and a sum of 1,500*l.* New Three per Cent. Stock, which together represented a total double that of a few years ago, the increase being mainly due to the initiation of Mr. George Godwin, F.R.S., and the exertions of the late Mr. T. H. Wyatt, aided by Mr. George Mair, the late Treasurer of the Society. Some months ago Mr. Godwin again urged upon the executive officers of the Society the paramount necessity of raising the Society's capital to 10,000*l.*, and he offered to present 100*l.* to the fund with the view to twenty-five other donors each presenting or collecting a like amount. Professor Hayter Lewis, the present Treasurer of the Society, also offered a contribution of 100*l.*, and he had accepted, at Mr. Godwin's wish, the difficult task of devising some scheme whereby the generous intention of the latter might be fulfilled. The time, however, was not favourable to such work,—to even a labour of love such as Mr. Godwin proposed,—and the Council were of opinion that it might be advisable to wait until the calamitous depression of trade and want of confidence in business affairs had passed away or abated. Since the last annual meeting, the honorary secretaries of other provincial societies had followed the excellent example of Mr. Holden, of Manchester, and had prepared circulars to the various architects in their several localities, pointing out the advantages of the Society and the pressing need of increasing its funds. At present the Council were not able to report as to the results of those efforts. The Society had a powerful claim on provincial architects, inasmuch as a large proportion of the applicants for relief were from the provinces. As an instance of this, out of nine applications considered by the Council that day, the majority were country cases.

The income account and balance-sheet for the year ended 31st December, 1885, duly certified by the auditors (Messrs. George Scamell and Hugh McLachlan), were presented with the report. They showed that the total receipts during the year 1885 were 632*l.* 11s. 11d., including 64*l.* brought forward from last account, 206*l.* received in dividends, and 360*l.* received in subscriptions. The disbursements included payment of one pension, 20*l.*; 580*l.* paid to applicants for relief; and 28*l.* 9s. working expenses, leaving a balance to be carried forward of 3*l.* 17s. 11d. on income account, a balance of 36*l.* 15s. 8d. remaining at the bankers.

Professor Hayter Lewis, Honorary Treasurer, in moving the adoption of the report and balance-sheet, said it was to be regretted that the Society was not at present receiving so large a measure of support from provincial architects as could be wished, but in other respects he thought the Society might be congratulated on having maintained its position fairly well, and on its subscription showing a slight increase, notwithstanding that the present time of depression was seriously affecting the income of many charitable institutions.

Mr. E. N. Clifton seconded the motion.

The Chairman, before putting the motion to the meeting, said the most satisfactory feature of the report was the increase in the annual subscription, slight though it might be, for it betokened a continued and a lively interest in the work of the Society. It behoved every architect to do something to help so deserving a Society. However prosperous a man might be, however lucrative a practice he might enjoy, he or his family might come to want the aid which the Society could afford. He regretted to say that two recent applications for relief were on behalf of the families of men who had made way in their profession and had done a great deal of work. He was sorry to see that, while the architects of some provincial towns were doing their best to help the Society, there was one large town where there was always a great deal of work going on, and where architects were numerous, and yet the Society only received a solitary guinea from that town. That was not as it should be. After mentioning a suggestion that he made a few years ago to the Council of the Society,—to the effect that every architect who takes pupils should, so to speak, send tithes of each premium to the Architects' Benevolent Society as some reparation for being the means of introducing new members into the profession,—the chairman referred to Mr. Godwin's offer, mentioned in the report, and which he hoped would meet with adequate response.

The motion was then put, and carried unanimously.

A vote of thanks was passed to the retiring members of council, viz.:—Messrs. T. G. Jackson, M.A., E. C. Robins, F.S.A., Prof. Roger Smith, Mr. Waterhouse, R.A., and Mr. E. N. Clifton; and to the auditors. To fill the vacancies caused by the retirement of members of council, and by the death of Mr. J. H. Good, the following gentlemen were unanimously elected, viz.:—Messrs. T. M. Rickman, Geo. Scamell, Lewis H. Isaacs, M.P., W. Grellier, C. R. Pink (President, Architectural Association), and Banister Fletcher, M.P. In case any two of these gentlemen were unable to serve, Mr. W. M. Fawcett, of Cambridge, and Mr. Thomas Wells, were nominated as alternative members. The President, Hon. Treasurer, and Hon. Secretary were re-elected; and Messrs. C. F. Hayward, F.S.A., and W. Hilton Nash were elected auditors for the current year.

Thanks were voted to the Royal Institute of British Architects for office accommodation, &c.; to the Honorary Secretary; and to the Chairman. In the course of the proceedings it was pointed out by Mr. Scamell that the working expenses of the Society averaged less than three per cent. of its total receipts,—a result, he said, which probably could not be shown by any other charitable society.

STUDENTS' DRAWINGS AT THE INSTITUTE.

FOLLOWING upon a disappointing competition this year for the Pugin Studentship, which was by many attributed to a growing taste among students for other than purely Gothic art, comes an equally disappointing exhibition of drawings in connexion with the Tite Prize, which would seem to show that, if Gothic is beginning to be neglected, at least the purer Classic styles have not yet taken its place. We think that from several points of view it is to be regretted that the judges awarded the Tite Prize at all, unless it is to be understood that only in very rare cases indeed is it to be withheld. Besides depreciating the value of the prize to other winners in other years, who have sometimes received it, and it may be hoped will often receive it, for really first-rate work, it will seem to many at any rate of those who were not present at the meeting on Monday week to set the stamp of the Institute's approval upon a class of architectural design which can only be described, at best, as good commonplace.

Whatever may be said, however, of the architecture of the design "Medicine," by Mr. B. P. Shires, of York, the plan is excellent, and shows not only considerable study and knowledge of the requirements of a medical school, but great care and no little skill in the arrangement of a rather complicated building; the elevation of the front looks better than the perspective, but we should like to see the central feature omitted.

"Spes," placed second, appeared to have good plans, but they were hung too high to be fairly seen; the detail is a little purer than that of "Medicine," but the design could hardly be judged by the terribly hurried ink perspective. "Doric," which was awarded a certificate of honour, showed a design in really good Italian style, pure in detail and correct in arrangement, but, unfortunately, the author had "come altogether to grief" in his plans. Among the rest we noticed "Hygeia's" clever effort in the Palladian style,—as to plan and grouping as well as detail,—a good and useful study, but unfinished, and without a chance of success in these days when Science is the master and would not put up with such a dissecting-room as "Hygeia" provides, for any artistic consideration whatever.

The competition for the Soane Medallion was well up to the average; it is only a little surprising that with such an attractive subject more cannot be said. Mr. A. Needham Wilson, who takes the Medallion, has a very effective set of drawings, executed with great care both as regards drawing and the more important points of planning and design. As in all the other really good designs, the nave and chancel are of the same width. A heavy-looking but effective tower, which stands over the north chancel aisle on rather inadequate supports, is shown in sharp perspective, as seen in a narrow street, in a beautifully-executed drawing, which was carefully hung at Conduit-street with the top of the vane on a level with the eye, or a little lower. It must be confessed that styles are rather unhappily mingled in this design,—most of the constructional, and many of the decorative, arches are of the blunt, stilted form peculiar to Early French work, while the tracery and canopies over the statues are of English fourteenth-century character. The design by Mr. J. H. Curry, placed second, is cleverly planned to make the most of the site. The most striking feature is the open cloister connecting the porch and transept on the street side. There is a central tower, and a morning chapel with a double curved end, which developes rather an ugly form in the roof. The drawing is effective.

Mr. Bidlake, who was awarded a medal of merit, has produced a design which shows certainly more knowledge and, probably, more power, than any of the others. We should much like to have seen what he could have done with more time and care. Mr. Schultz (certificate of honour) has attempted a central octagon plan and a design in a not very happy rendering of the late brick Gothic style of the North German or Dutch churches, with an "onion" dome. There were two other designs shown with central domes, neither of which calls for much remark. The design "Angelus" showed a fine open plan inside and an effectively piled up group outside, but we cannot commend its style and detail.

As is often the case, the competition for the Silver Medal for measured drawings produced the best work of its kind. Architectural drawing has now been brought to such perfection that, among the best draughtsmen, the choice of a good subject, and plenty of time to finish the drawings with due care, become very important elements of success, and but for these elements we believe the judges would this year have had a far harder task than fell to them. Mr. E. H. Sedding's drawings of St. Magnus, London Bridge, and of Grantham Church, Lincolnshire; Mr. A. B. Mitchell's, of Layer Marney Towers, Essex; Mr. E. L. Conder's, of Long Melford Church; and Mr. S. H. Barnsley's of Old Cleeve Abbey, are all first-rate specimens of drawing; but perhaps the detail of the Ionic capital of St. Magnus Church is quite the finest piece of work of the kind that has been yet seen at Conduit-street.

The Grissell Gold Medal only attracted one competitor, Mr. A. A. Cox, who has produced an octagonal iron roof, of somewhat novel construction, standing, as far as we could judge on a hasty view, on rather inadequate piers.

There is no doubt that Mr. Paul Waterhouse's and Mr. Oldrieve's essays well deserved the prizes awarded them.

FREE LECTURES TO ARTISANS AT CARPENTERS' HALL.

A GOSSIP ON THE PHILOSOPHY OF BUILDING MATERIALS.

THE third of the present series of free lectures to artisans under the auspices of the Carpenters' Company, was delivered on the 3rd inst., by Professor Kerr, F.R.I.B.A., and was entitled "A Gossip on the Philosophy of Building Materials."

Professor Kerr said he wished to take his hearers a little below the surface of things, even in so humble a matter as building materials, and to ask in the first instance how far they supposed Nature or Providence had undertaken to supply them with these materials? Many might answer off-hand "altogether," but he was prepared, on the contrary, to advance the doctrine that nature did not profess to supply them at all. One of his objects, therefore, was to satisfy his audience that enterprise in the direction of the invention of building materials was a thing to be considered with the utmost interest. A friend of his, very learned in the science of geology, found himself a few years ago in the company of a Scottish divine of the usual orthodox type, a pleasant man, but one with very confirmed opinions. The conversation having turned upon the antiquity of the globe, the geologist found the ecclesiastic was thoroughly satisfied that this earth was suddenly made out of nothing by an omnipotent power, exactly 4,004 years before the commencement of our era. The geologist, who held a very different opinion, asked the clergyman how he could account for the existence of the fossils found deep down in the stone. The reply was that they were not fossils at all, but that the devil had

put them there for the express purpose of deceiving people like the interrogator. Now he (the speaker) hoped they had got a little beyond that stage of belief, and he would first ask them to consider what stone was. Granite was a compound of broken grains of quartz, feldspar, and mica, which had somehow reached the surface of the globe boiling hot, as it might now be found not many miles below the floor of Carpenters' Hall. Sandstone, again, was a deposit of those grains which were washed down from the summits of the mountains by denudation, carried down the rivers, and deposited and compressed long ago. As to limestone, if they looked into the deep sea they would find the water charged to the full with myriads of little shells whose inhabitants had fulfilled their destiny and died, and which were falling through mile after mile of the depths of the ocean, and forming limestone at the bottom. These were materials which they were accustomed to say that nature had provided. He would take another case, that of timber. The tree was not grown for the purpose of furnishing timber, but in the luxuriance of vegetation lasting its day, dying when it had fulfilled its purpose, and being converted into coal. These were the natural materials, but he would take another, viz., brick. Nature did not supply them with brick, but only with mud or clay. How much more available a material was brick than stone! For instance, most of them knew what "bond" meant, and how brick fulfilled that condition. Terra-cotta and pottery were still more useful, so to speak, and altogether artificial. He would also refer to the most entirely and unreservedly artificial of all materials, viz., iron, and to artificial stone for grindstones, which beat everything else in its special line. The fact, therefore, was simply this, that natural materials had to be adapted, and those materials which were not so adapted had to be created; therefore, there was great scope for the invention of man in the legitimate enterprise of inventing artificial materials to correspond with the artificial purposes of building. The countries of the world might be divided into the two categories of stone and clay countries, and out of this arose the first great distinction in regard to building. In all probability brick was used before stone, except where stone walls of a very rude kind would necessarily be used in a stone country; but it was remarkable that the earliest known use of stone in anything like ordinary building was its use in enormous masses. Rude and rough small rubble stone might have been used at first, when better was not to be had, and when the skill of the workman was primitive indeed; but it was a remarkable thing that the most ancient remains of stone building were composed of stones of the largest size. This brought him to the distinction between Egypt and Assyria, as the representatives of the two rival civilisations of antiquity. Egypt was a stone country, Assyria a clay country, so that whereas the remains of Egyptian buildings were in existence at the present day, those of Assyria had wholly disappeared, except some pieces of sculpture which had doubtless been brought from a distance. This also reminded him of the distinction between London and Paris. No one of his age could now pass through the streets of London without being struck by the enormous progress which had been made in building within the last thirty years. Still, though stone had been largely used, London could not attempt to vie with Paris. The existence of the beautiful stone underneath the city of Paris might have had something to do with the peculiar grace and elegance of Parisian artistic sensibility. But, at all events, there was a clear manifestation of the distinction between the clay basin of the Thames and the stone quarry of Paris. Turning to timber countries, it seemed probable that good building was in every case first manifested in timber. The Greek temples in their design pointed distinctly to a timber origin, while Solomon's Temple appeared to have been mainly built of wood. One of the most remarkable peculiarities of ancient times was that of massed labour. The division of labour nowadays gave to every man his own province, and the result of combination was the production of such works as we were familiar with. But when we saw the great works of primitive antiquity, it was difficult at first to understand how such enormous masses of stone could have been moved and placed. The answer was always the same,—it was done by massed labour. Turning to stone, he had already explained what granite, sandstone, and limestone were. Magnesian limestone was rendered partly crystalline by the accidental passage of a stream of volcanic heat in the formation of the stone, and that reminded him of the story of the stone used in the erection of the Houses of Parliament. For this purpose it was determined to employ the best stone to be found in the three kingdoms. Portland stone, as they knew, was a very good stone, but it had one remarkable and serious defect,—on one side it became blackened with the London soot, while on the other side it was blanched with wind and rain, the two effects being in most dismal contrast. It was therefore determined to discover a fitter material, and a Royal Commission was sent all over the three kingdoms to examine the different stones. They did their work well, and at Southwell, in Nottinghamshire, found a church of the Norman age, with its carvings as clean cut as if done the year before. This stone was carefully examined, and found to be the Mansfield Woodhouse stone, which the Commission determined should be used. No pains, however, were taken to inquire whether there was enough of it; so, by the time the basement had been built the supply of stone gave out. They next found the Anston stone, in the same neighbourhood, a stone partly made crystalline by a stream of heat passing through a certain portion of the quarry, the crystalline and non-crystalline stone being quite indistinguishable. This was quarried, and sent up to London. Mr. C. H. Smith, a well-known mason in Titchfield-street, was one of the commissioners, and was appointed to examine the stone as it arrived, but by reason of some difficulty in the matter of his remuneration, he naturally declined to serve. The consequence was that the stones came in without being checked, and the result was that those which were non-crystalline were the stones which had decayed. Out of this decay arose the idea of stone-preservatives. A great many people were permitted to apply their nostrums to the face of the building, and it was well understood that the one object of a stone preservative was to keep out the wet. Let them consider for a moment where the Houses of Parliament stood. For the sake of being placed over a perfectly useless and purely traditional place, called St. Stephen's Chapel, the building was put on the bank of a dirty river, opposite the filthiest manufactories that could possibly be devised, generating gases directly destructive of stone. These gases were suspended over the river in the fogs, or blown straight against the beautifully carved surfaces, and carried with the wet into the stone, with the most lamentable results. If the moisture could be kept out, so would the destructive gases, and for this purpose some of the inventors used such things as boiled oil and shellac, but none of them were good for anything. One invention, however, was brought out, which he was sorry had not been more successful in this country: he referred to Ransome's preservative, one of the most admirable of scientific contrivances. Ransome conceived the idea of forming silicate of lime inside the stone; he first washed it over with silicate of soda, and after allowing it to settle into the substance of the stone, he applied chloride of lime in the same way. A chemical combination was the result, silicate of lime being produced within the stone, and common salt thrown out in small quantity. Ransome's artificial stone was still more ingenious, because it was the practical application of the idea. Here any sand, provided it was clean, was mixed into a paste with silicate of soda. When made up and moulded under pressure, it was submitted to the action of chloride of lime; a cross-combination ensued, and without the application of heat or anything else, silicate of lime was formed within, so as to constitute the sand an artificial and perfect sandstone, the chloride of sodium being washed out. Thus was produced a perfect material wholly artificial, and even better than natural stone. Owing to our prejudices, however, Ransome's invention had not been a success in England, though he understood it had been more successful on the other side of the Atlantic. Our prejudices now were artistic, and we abhorred shams, but he could not help being sorry that so meritorious an inventor should have cause for complaint as to the reception of his brilliant invention. Dealing with brick, the first mention of anything like good bricks was in connexion with the Tower of Babel. In early brickwork there was a rivalry between the sun-dried and the fire-burned brick. The sun-dried was similar to clay-lump, and was a very good material so long as the wet did not get at it. The bricks made by the Israelites in Egypt were sun-dried, the clay being mixed with just so much straw as would give bond to the bricks. In cutting a brick two things had to be considered; in the first place, it must be a soft brick, and, in the next place, the cutting would remove the protecting surface, thus rendertng it a bad and rotten material. It also seemed a pity that so much ingenuity should be wasted for the mere whimsy of the moment, in the imitation of Dutch architecture, when we could do so much better with our own. In endeavouring to improve anything in this world, as regards the eye, a price had invariably to be paid in the disturbance of substantiality. The best brick facing was plain selected stocks, and the more they were chosen for beauty of effect, the more was this obtained at the sacrifice of substantiality. Glazed bricks were not liked for facing, but was it not possible to glaze or semi-glaze a brick or stone? Any one who could invent a glaze which would not require heat, but would still keep out the weather, would, he believed, make a fortune. Our brickwork was dirty, and we would not fall into the good French habit of giving the houses a wash down once a year. As to mortar, the earliest buildings of any magnitude were built of great masses of stone without mortar. The first mortar was tempered clay,—unburned brick and common clay making a good wall of its kind in the East. The next mortar seemed to have been burned brick and asphalte. The theory of lime mortar was that it consisted of lime and sand,—an artificial stone, like concrete, composed of sand with a minimum of lime and water. The sharper the sand, the better the mortar; the strength of the mortar was in the sand, and therefore the theory of perfect mortar was that it should be composed of grains firmly dovetailed together, with just enough of lime to fill the interstices, and no more. Mortar made without sand had no strength; and the question of the minimum of water was a vital one. The water had to dry out, thus leaving the spaces empty, so that the more water that was put in, the less solid was the artificial stone which the mortar constituted. Timber was a natural and very crude material, of fibrous and at the same time multitubular structure. This required to be seasoned. The tree was felled at a time when the sap was at its lowest, cut into logs, and kept in running water, so as to wash out the sap, which was albuminous. When this was done the tubes which contained the sap contracted, and so resulted the shrinkage of the timber. This was a material which, on the face of it, ought to be improved on, and nature insisted upon this being discovered sooner or later. Indeed, the purposes of building were wholly artificial, and no material was supplied upon the responsibility of nature, but upon the responsibility of man, who was expected to improve it in the course of ages. Iron, again, was a material as absolutely artificial as if it were had from another planet. To the ore (which looked very unlike a built girder) was added a flux which produced slag, the result being pig-iron, and here was artificiality of an extreme character already. The pig-iron was then re-melted and became cast-iron, a most valuable material of a granular texture, but at the same time somewhat treacherous, acquiring in the process of cooling accidental fractures and air-holes in the interior, which no amount of inspection short of testing would discover. Malleable iron was still more artificial, being refined and submitted to the blows of the hammer. The pig was a granular material, but when refined it seemed to lose this character, and under the roller or the hammer acquired fibre in the direction of the pressure, so that the identity of character with cast iron was entirely gone. By repeating the process the iron became more and more fibrous, until an iron tube could now be bent by the pliers into a spiral of 2 inches in diameter. Rolled iron was even more artificial, when they looked at a built girder, and considered that it was just as if it had been cut out of paper with a pair of scissors: they would agree that the extreme limit of artificial material had been reached by the persevering ingenuity of man. And here they would observe that the more the artificiality, the

more the reliability of the material. The weak point of iron was its liability to rust. Iron oxided like anything else by reason of its contact with air, and could only be protected by being galvanised or painted. Galvanising was originally done by what might be termed the electical process, but was now accomplished by dipping into a bath of zinc. The reason for using zinc was that, though it oxided, it was protected by its oxide. But the protective processes for iron were as yet imperfect, so that structures like the Crystal Palace or the Tubular Bridge over the Menai Straits, must be considered to be theoretically and practically weak. He believed, however, that, in the course of time, some application would be invented to protect iron effectually against the influences of our moist climate, and if so then it must have a great future before it for constructional works. The slag thrown off in smelting was also a material which promised great things in the hands of inventive ingenuity. Lastly, he would say a word about paint. Common oil-paint originally was a coating of white-lead and oil. A coat of paint was the formation of a film of carbonate of lead, to protect the wood or iron from the influence of the atmosphere. The oil,—the vehicle,—evaporated, leaving the carbonate of lead dry on the surface. The more pigment that was used the more was the white-lead weakened, pure white-lead being a strong and substantial coating. Professor Kerr, in conclusion, hoped he had succeeded in persuading his audience that there was much room for the exercise of ingenuity in the direction of artificialising building materials, and that nature did not undertake to find us in these materials, but, on the contrary, expected us to prepare our own.

The lecture was enlivened throughout by a variety of historical and anecdotical allusions.

On Wednesday evening last the fourth lecture of the series was delivered by Mr. T. Chatfeild Clarke, F.R.I.B.A., his subject being "The Architecture of City Buildings." Mr. Alfred Preston, a member of the Court of the Carpenters' Company, presided, and the lecturer was listened to with marked attention, his remarks being frequently applauded. A report will appear in our next issue.

MOULDINGS.*

BY GEORGE AITCHISON, A.R.A.

IN the Middle Ages the total size of every group of mouldings depended on the thickness of one course of stone. The architects altered the profile according to the size of the building, i.e., in large buildings the members were few and large, in small buildings they were many and small. This was opposed to the ancient system, where the module was adopted. One course might serve for a small Corinthian cornice; while the cornice to a large order might require several courses.

There are two main moulded members in a building, the cornice to throw off the wet, and the base moulding to spread the weight. Their shape must clearly explain their use to bring them within the pale of art. The Dorians did this most admirably; the top fillet was a drip-stone, the hawk's-bill was a drip-stone, and so was the corona; there was little reason for this in the sloping pediment, and they, therefore, crowned it with a cyma. The bottom of the column was large, and the steps acted as footings. The Ionians, living in Asia Minor, probably had less necessity to guard against rain, and had more sun; hence, in the Ionic, the crowning member of the cornice is mostly an ovolo. In this order the columns have bases.

But we must not lose sight of one thing, that though the corona may have a purely useful end,—that of protecting the face of the building from rain,—it has an equally important æsthetic end, that of producing a deep shadow where it was wanted, æsthetically to tie the building together, and to repeat and affirm the horizontal shadow from the lower edge of the architrave, broken by the capitals of the columns.

In the smallest thing connected with architecture we must always bear in mind that it is originally founded on construction, and cannot stray far from it if it is to satisfy the reason and the sentiment. We are far removed from Greek times, and have not even a tradition of their ways and thoughts in relation to architecture: so we can only try to resolve their problems by examination of their works and reflection upon them. Vitruvius, who hands us down something he learned from them, is a bad guide; he not only came late, when everything had fallen into rules, but he was using a wholly exotic art.

The Roman building material was rubble; the Greek material was marble. Of æsthetic architecture in its proper sense he was absolutely ignorant. He did not even know what it meant. When he had done his building he wanted to make it architectural, and for that purpose he considered he must stick on to it some sort of caricature of a Greek temple. English architects at the beginning of this century had much the same view. They built a square brick box, with holes for windows and doors, and plain projecting eaves and gutters; but they wanted it to be architectural: to achieve this they added a porch of Greek Doric or Ionic, in stone, wood, or plaster, and the thing was done. It is certain that Doric columns were derived from stone, and not from wood construction, as they get thinner as the Greeks learned more about stability. The architrave was probably stone, and the eu-style, sy-style, dia-style, and areo-style were expressions of the bearing power of the stone,—in masons' words, "safe," "too thick," "rather thin," and "risky." The projection of the corona was to some extent governed by the thickness of the walls; it would have toppled over if the tailing had not been greater than the projection.

We modern architects are too much divorced from our materials, so that our mouldings are too apt to represent artistic rather than real needs. The early Mediæval architects were mostly masons, even so late as the building of the Ducal Palace at Venice. The architect, Bon, was called a stone-cutter (*taglia pietra*). Carpentry, too, is extinct in England, and so are carpenters: excepting the hedge-carpenter, we have none,—they are all joiners,—and their maxim is never to work timber, but to case it. The Saracen architects did the same. Their beams are often round balks, with the square ends, and fretwork in thin casing. In consequence of this the architect loses all sense of constructive propriety in his mouldings,—their only propriety is æsthetic.

About 300 A.D. the Romans began to think about architecture, began to abolish lintels, and use arches; but they still adhered to the entablature, and put it over the arches. The Greek architects who worked in Syria also thought (I am by no means sure that Diocletian's architects were Romans, and not Greeks); the orders began to be lengthened out, to suit their position. Ionic pilasters may be found at the angles of the basilica at Chaqua, running from top to bottom of the building, some 20 diameters high. The cap comes under the architrave, and in the middle of the pilaster is a moulding. But before this epoch in Europe the orders got turned into long shafts, with their caps under the cornice or architrave. In Syria the frieze had been discarded, the architrave had been moulded, and the cornice was a flat projecting stone, with a gutter in it. The Crusaders made acquaintance with these Syro-Roman or Syro-Greek buildings, and from them much of the Romanesque work was taken, and their methods and features were altered and improved upon when Gothic began. The cornice proper in Early Gothic first consisted of a drip-stone, with a large quirked ogee beneath it, and the frieze was a hollow and bead, filled with leaves. Eventually this sculptured frieze was omitted, and the cornice came to be but a drip-stone and hollow, the whole tendency being to use cornices merely as a narrow string, of the least possible importance.

It is in the archivolts and vaulting ribs, and in piers, that profusion of moulding is to be found; and it is by studying successive examples of them that we see the stages of alteration and improvement in the mouldings. In archivolts of the early part of the thirteenth century, a common form is a large torus, forming the bottom arch, flanked by a smaller quirked torus on each side; then the lower torus got a fillet or nose put on it to mark the centre; then the side toruses got their fillet; then the spaces between were hollowed; then subsidiary beads got put in, until at last the lower torus became a prism with hollowed sides, and the side ones were so hollowed out and undercut that they became a sort of ogee. The setting out was, from first to last, on virtually the same geometrical form, a triangle of 45 deg. or 60 deg. And the mouldings alone were gradually altered, as more skill in construction was acquired, and greater lightness, elegance, and variety were demanded.

I do not intend to give you an archæologic history of Gothic mouldings, I merely want to point out that where the Mediæval architects perceived a defect they remedied it; where they saw an improvement might be made, they tried various means until they got the effect they wanted; not by capriciously abandoning their system, but by variations and improvements in the detail.

In spite of being trite, I will say that in horizontal mouldings, those that are concave rarely look well as supporters; an ovolo or ogee does best for that, and cymas or cavettos as crowning members. The Greeks felt this in their Ionic bases, and brought out the fillet of the scotia to the face of the torus above, so that it might have a solid bearing under it. Inside mouldings must be treated differently from those outside, as the light inside is diffused, and in certain places is below instead of above them, and they are lighted only by reflected light. I may also mention that in places that are only, or mainly, seen by artificial light, the mouldings may be designed as for sunlight; only care must be taken to ascertain the level of the light. An excellent group of mouldings, designed for a top light, may be lost or look ugly when the light comes from below. A little inquiry, thought, and care will prevent such untoward occurrences.

There are some effective groups of mouldings in some of the mirror and picture frames at Venice, mostly Milanese work; these groups begin with a small projection from the wall, carried on some distance, and then a bold, projecting moulding comes out, and from that the face recedes but slightly to the picture or glass; besides the differences of plane, effect was gained by the use of fillets of considerable projection chamfered on the edge. Much of the effect is also due to a peculiar ornamenting of the surfaces by undulation, and by carefully contrasting the different qualities of surface, some being left wholly plain.

Brick, soft stone, hard stone, and marble require different treatment in moulding. Brick requires a greater difference in treatment than stone or marble, particularly in the projection of the planes. With a 9-in. brick you can with difficulty get any considerable flat projecting surface.

Soft and hard woods must be moulded differently; very thin members break off in soft wood, and sharp edges get broken off or bruised.

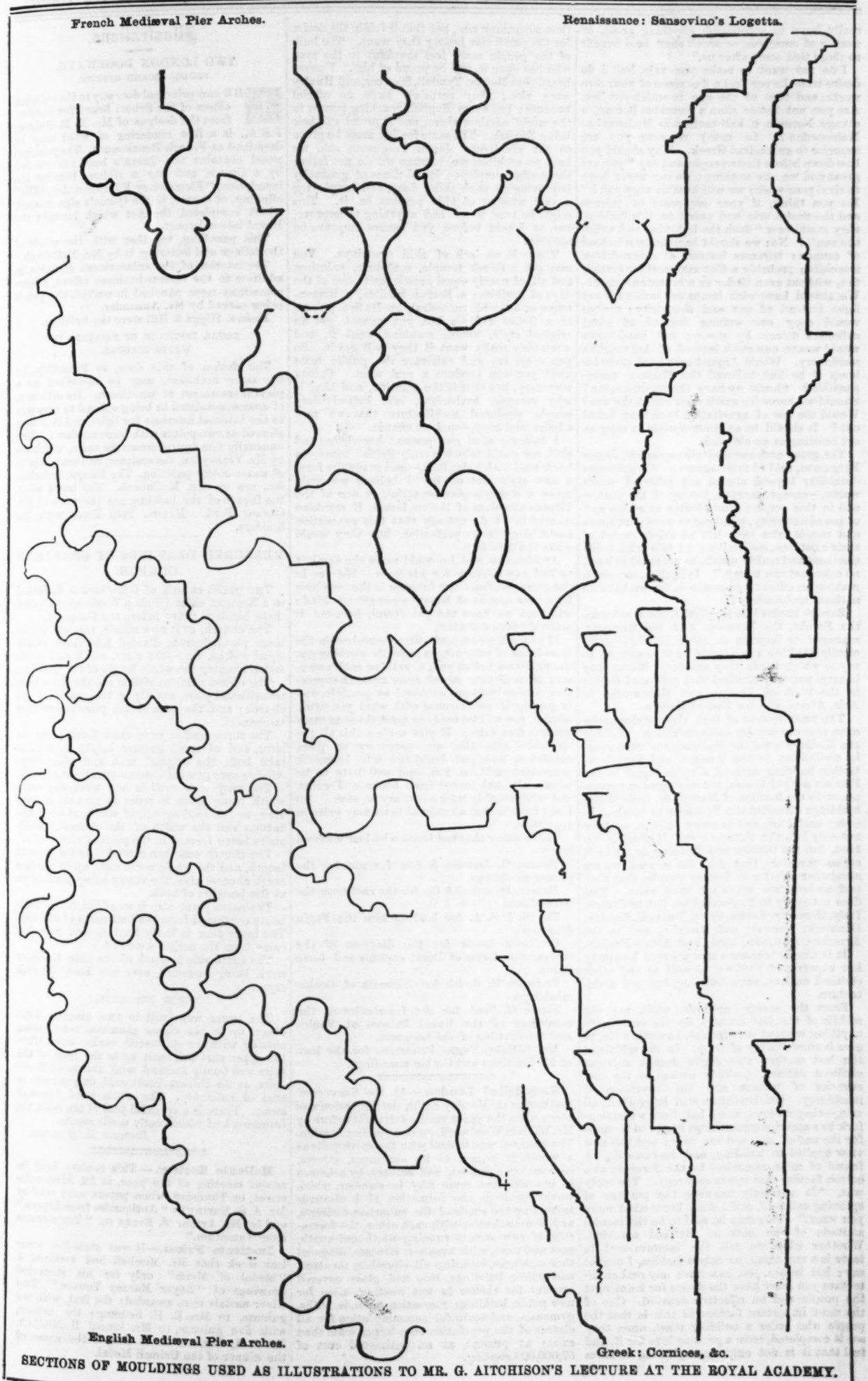
Metal, too, requires different treatment from marble, stone, brick, or wood. You may get edges as sharp as you like in metal, but you cannot undercut, because the pattern will not draw.

We can never progress unless we resolve, think, strive, and learn. It is mainly to this end that I have given this lecture. We must resolve what effect we want; we must think how this effect can be got; and we must strive to make it as beautiful as possible. And when it is done, we must learn from our failures how to do it better next time. But this is not enough, for this only deals with individual experience, and what is wanted is aggregate experience.

From each architect, or each small group of architects devoting themselves to separate styles, the profession is a mere aggregation of individuals or of knots of men; lacks all the cohesion and discipline of an army, and cannot, as a body, benefit by experience. The successes or failures of the knots or the individuals only instruct the man or the group. A knot of imitators of Greek learn nothing by the success or failure of Mediæval imitaters; this is well put by Fergusson:—

"The only one means by which man ever did anything great, either in the useful or fine arts, was by this aggregation of experiences. One man may be equal, either intellectually or bodily, to two or three of his fellow-men; but one can scarcely be equal to ten others, much less to a hundred or a thousand; and at all times it will be found that a thousand little steps of a thousand little men, if in advance of one another, will surpass the stride of the greatest intellectual giant the world ever saw; and it is only by steady perseverance onward that we can

* Continuation of a lecture delivered at the Royal Academy on the 25th ult. See p. 365, *ante*.



SECTIONS OF MOULDINGS USED AS ILLUSTRATIONS TO MR. G. AITCHISON'S LECTURE AT THE ROYAL ACADEMY.

really hope to accomplish anything great, or worthy of ourselves, or which shall be a benefit to those that come after us."

I do not want to make you vain, but I do desire to make you feel a due sense of your own worth, and that of the age in which you live. Are you not better than a ferocious Roman, a savage Norman, a half-barbarous Mediæval or Mahomedan? In many respects you are superior to an ancient Greek. Why should you bow down before these people, and say "you are great and we are nothing; we can never hope to rival your work; we will humbly copy you?" Do you think, if your compeers in science and the useful arts had posed in this fashion, they would now "flash the lightning and weigh the sun"? No: we should have balistæ instead of cannon; triremes instead of steam-driven ironclads; probably a flint and steel for getting fire, without even tinder or a brimstone match. We should have wick lamps or torches for our light instead of gas and electricity; scribes would copy our writing instead of giant cylinders driven by steam; and hand-looms would weave our cloth instead of Arkwright's machinery. Would Argand ever have made his lamp if he had believed the Romans unsurpassable? Should we have the steam-engine? Should we know the earth went round the sun? Would the law of gravitation have been found out? It should be as contemptible to copy an old building as an old book.

The great architectural ethnographer, James Fergusson, said of architecture:—"It possesses durability beyond almost any other of man's works,—except, perhaps, the lay of the poet,—and in this respect comes before us with a sort of pseudo-eternity, speaking to us of past times and people who have left no other record of their existence, and telling its tale with a distinctness and reality which, to my mind at least, no other art can match." Is it, then, not worth making an effort to re-create it, for we have no national architecture?

Savage hordes like the Goths, the Lombards, the Franks, the Normans, and the Saracens, managed to impress on their buildings sufficiently striking characteristics to enable us to say to which horde they are due. When they became partially civilised they produced Gothic in the West of Europe, and Mahomedan in Asia, Africa, and the East of Europe.

The masterpieces of both these styles excite even now our wonder and admiration. Neither the Mediævals nor the Mahomedans were equal in civilisation to the Romans, and though no Gothic building covered a space equal to the Flavian Amphitheatre, nor was equal in permanence to the basilica of Maxentius, their tallest buildings exceeded the Pyramids in height. In every useful art, and in every science, we have not only left the Saracens and Mediævals behind, but the Greeks and Romans as well; it seems, therefore, that it is not because we are altogether inferior to former peoples that they had architecture while we have none. This does not apply to England alone, but to France, Italy, Germany, Russia, Spain, Portugal, Sweden, Denmark, Norway, and America, and to the Americo-, Australo-, Indo-, and Africo-English.

It is simply because a new phase of humanity has supervened that we, as well as the other civilised nations, have building, but not architecture.

From the savage upwards, until, say the middle of the last century, no one ever made anything without an attempt, however rude, to give it some beauty of form. In the middle of the last century this desire ceased amongst civilised nations, possibly owing to the discoveries of science and the invention of machinery. Old traditions still hung about all arts,—they do even now; but, from a toasting-fork to a steam-engine, things began to be made for the end of use, and use only; and this new view applied to building, and does so still. A friend of mine remarked to the foreman at a cotton factory that it was very ugly. The reply was, "It perfectly answers the purpose of spinning calico in, and I don't know what more you want." This may be said to be the mental attitude of the bulk of civilised mankind. Whether what we call the improvement in taste is a real thing, or only a fashion, I cannot say; but before you can have any real architecture you must have the desire for it amongst the people and an effective demand. One of the most important factors in this is that the people who order a building must, when they see it completed, have a genuine love for it, and feel that it is not only more pleasing to them than something else, but that it fulfils the desire for the particular beauty they want. The bulk of the people must feel thankful to the man who has done it, and be proud of him. I never heard that Messrs. Tyndall, Spencer, and Huxley were rich; they certainly have no official honours; but every English-speaking person in the world admires them, and is proud of their being English. The same feeling must be given to the architect. James Fergusson said we have no architecture, because we do not follow the method employed in old times of gradually improving on each thing done, and employing a vast number of able persons on it. This might be true, if we had anything to improve, but, as I said before, you cannot improve on nothing.

There is no lack of skill nowadays. You may get a Greek temple, sculpture, painting, and all, of nearly equal excellence to one of the days of Perikles; a Roman basilica, a Romanesque or a Gothic cathedral, an Italian palace, or a Swiss châlet; but you cannot get an original style, unless mankind want it, and when they really want it they will get it. So you must try and cultivate the public taste until you can produce a real want. Critics may carp, but that is the solution, and that is why savages, barbarians, and half-civilised people produced architecture that we now admire and copy,—and we cannot.

I believe, with our present knowledge and skill, we could take the truly British house,—a brick wall with holes in it,—and gradually form a new style out of it. I believe we could make a steam-engine beautiful, or one of the hideous abortions of the engineers, if mankind wanted it. I do not say that this generation could bring it to perfection, but they could make the first step.

Archimedes said he could move the earth if he had any fulcrum for his lever. We are in the same position: our fulcrum is the true love for a new species of beauty amongst mankind; and that we have not yet found, because it probably does not exist.

If you will go on perfecting yourselves in the knowledge of your art, in logically working out the problems before you, in making each necessary piece of your structure as true, as expressive, and as well-proportioned as possible, and in getting it ornamented with what you truly admire, you will be ready to meet the true taste when it does arise. If you neglect this all the recondite arts that are necessary to plan, construct, and put buildings into harmonic proportion will be lost, and will have to be laboriously disinterred from books and ruins, and will probably take a century or more. All I can hope is that a national taste may arise in your time.

The lecturer thanked those who had assisted him:—

Messrs. G. Jackson & Son for running the plaster mouldings.

Messrs. Brucciani & Co. for the cast from the Erechtheum.

The R. I. B. A. for lending him the Pugin drawings.

Professor Lewis for the diagram of the comparative forms of Doric capitals and Ionic Bases.

Professor R. Smith for diagrams of Gothic mouldings.

Signor G. Boni for the fac-similes of the mouldings of the Ducal Palaces at Venice and the drawing of the Loggetta.

Mr. Bidlake, Pugin Prizeman, for the loan of his drawings and Gothic mouldings.

Remodelled London.—At the Surveyors' Institution on Monday night, the discussion was renewed on the paper read a fortnight before by Mr. William Woodward, on remodelling London. The proposal was to deal with the metropolis as a whole in regard to its entrances, streets, squares, open spaces, and edifices, by schemes of improvement, some fifty in number, which would result in the formation of boulevards traversing the whole of the suburban districts, and communicating with each other, the formation of new streets running north and south, east and west, with avenues, circuses, diagonal thoroughfares, isolating all churches, theatres, and public buildings, iron and glass covered arcades for shelter in wet weather, sites for new public buildings, recreation grounds, baths, gymnasia, and healthful accommodation for all classes of the population on a larger scale than exists at present, at an estimated cost of 67,000,000 sterling.

Illustrations.

TWO LONDON DOORWAYS.

SCHOOL BOARD OFFICES.

THE new principal doorway to the enlarged offices of the School Board for London, from the designs of Mr. E. R. Robson, F.S.A., is a free rendering of what may be described as French Renaissance. The principal panel contains the Queen's head surmounted by a Crown, and has a ribbon bearing the inscription, "Elementary Education Act, 1870," alluding, of course, to the Queen's sign manual, which completed the Act which brought the Board into existence.

This panelling, together with the whole of the foliage and lettering, is by Mr. McCulloch.

The interior of the enlargement contains, in addition to the various business offices, a large committee-room panelled in walnut, the panels being carved by Mr. Aumonier.

Messrs. Higgs & Hill were the builders.

ROYAL INSTITUTE OF PAINTERS IN WATER-COLOURS.

The design of this door, in Piccadilly, by the same architect, may be described as a playful treatment of neo-Greek. Its difficulty, of course, consisted in being obliged to give way to the internal interests for light, and it is thus pierced at two points with large windows. Two unusually fine figures crown the same, which are by Mr. Verheyden, the sculptor, and are symbolic of water-colour painting. The foliage, lettering, &c., are by Mr. McCulloch. The busts along the façade of the building are the work of Mr. Onslow Ford. Messrs. Peto Bros. were the builders.

MEASURED DRAWINGS OF GRANTHAM CHURCH.

THE parish church of Grantham is dedicated to a Norman saint (Bishop Wolfran), who died three hundred years before the Conquest.

The church, as it now stands, consists of one large parallelogram divided into three nearly equal widths, viz.,—the nave, north and south aisles, running the whole length of the building.

The oldest portions visible are the three nave transitional piers, exactly in the centre of the church; and the core of the piers at entrance to chancel.

The three arches over these three piers are later, and of much greater height in order to take both the original arch and clearstory-window over (see arch-stones over these arches).

The very wide arch is late work, the extra width being given in order to give the utmost view to the rood-screen, of which stone foundations run the width of the chancel, newel-stairs being formed in the piers of either side.

The church was then extended to its present length, and the whole north aisle up to the late north chancel aisle, the vestry being jammed on at the junction of both.

The north porch also is an addition, the walls being continued from the buttresses of one bay. The inner door is Early English, and probably came from the earlier west end.

The south side is much of one date, the later work being eastward, over the Early English crypt.

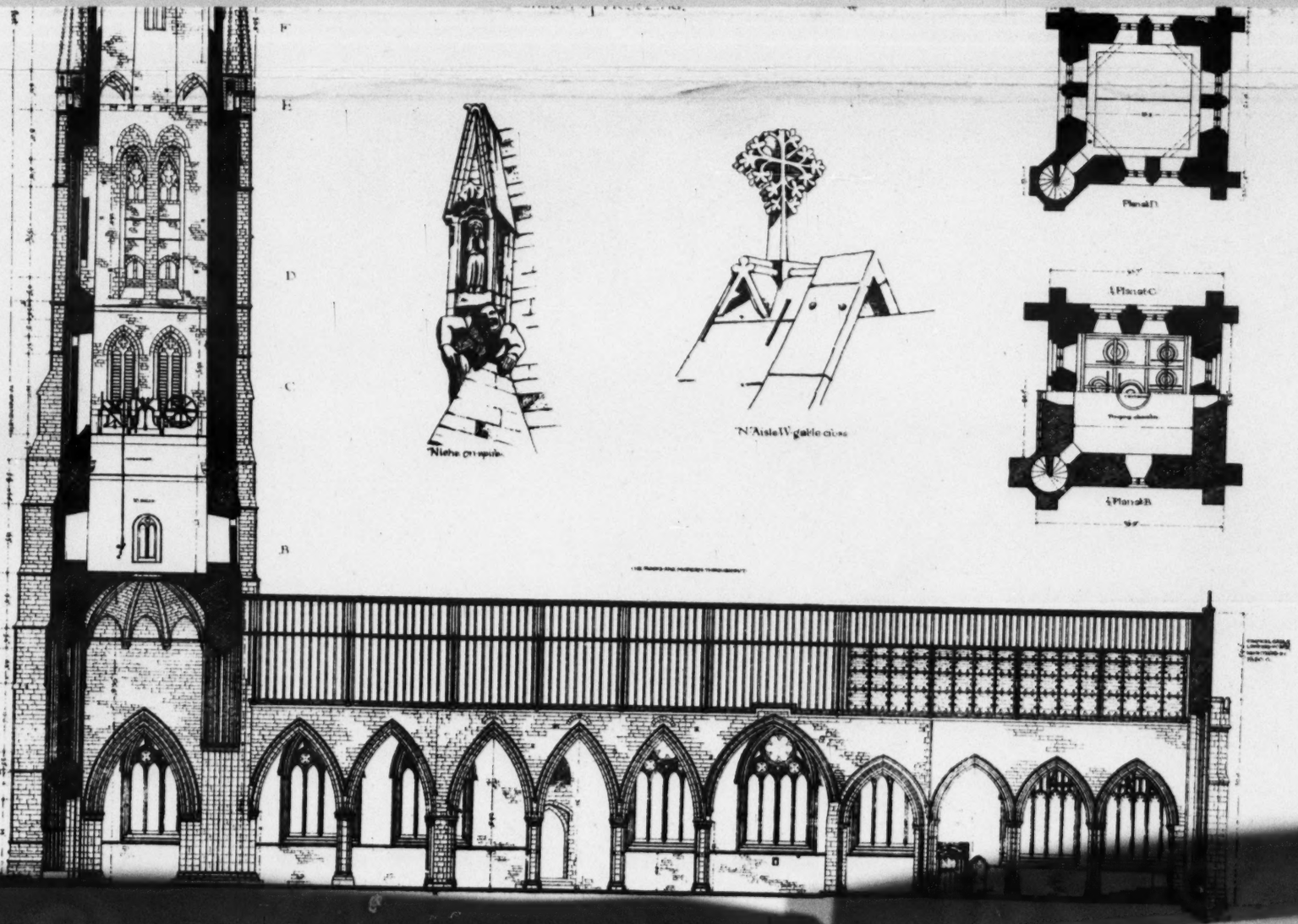
TOWER AND SPIRE.

The tower was built in two stages. First stage, up to the chime chamber, terminating outside with the quatrefoil work. Soon after, the upper part was built up to the base of the spire and finally finished with the magnificent spire, as Sir Gilbert Scott said, only second to that of Salisbury. The whole is of Ancaster stone. There is a splendid peal of ten bells, the framework of which sadly needs repair.

EDMUND H. SEDDING.

Hellenic Society.—This Society held its second meeting of the year, at 22, Albemarle-street, on Thursday, when papers were read by Mr. A. S. Murray on "Antiquities from Lipara," and by Mr. Arthur J. Evans on "Terra-cottas from Tarentum."

Institute Prizes.—It was stated in error last week that Mr. Mitchell had received a "Medal of Merit" only for his measured drawings of "Layer Marney Towers." Two silver medals were awarded; the first, with ten guineas, to Mr. E. H. Sedding; the second, with five guineas, to Mr. Arnold B. Mitchell. Mr. A. A. Cox, not A. R. Cox, is the name of the winner of the Grissell Medal.


F
E
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Plan of D
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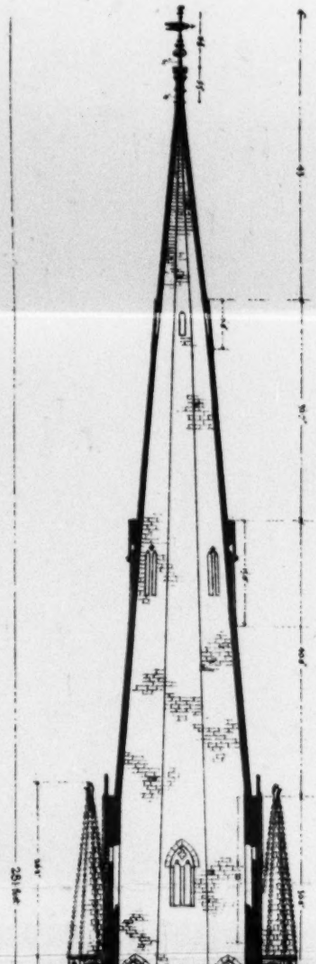
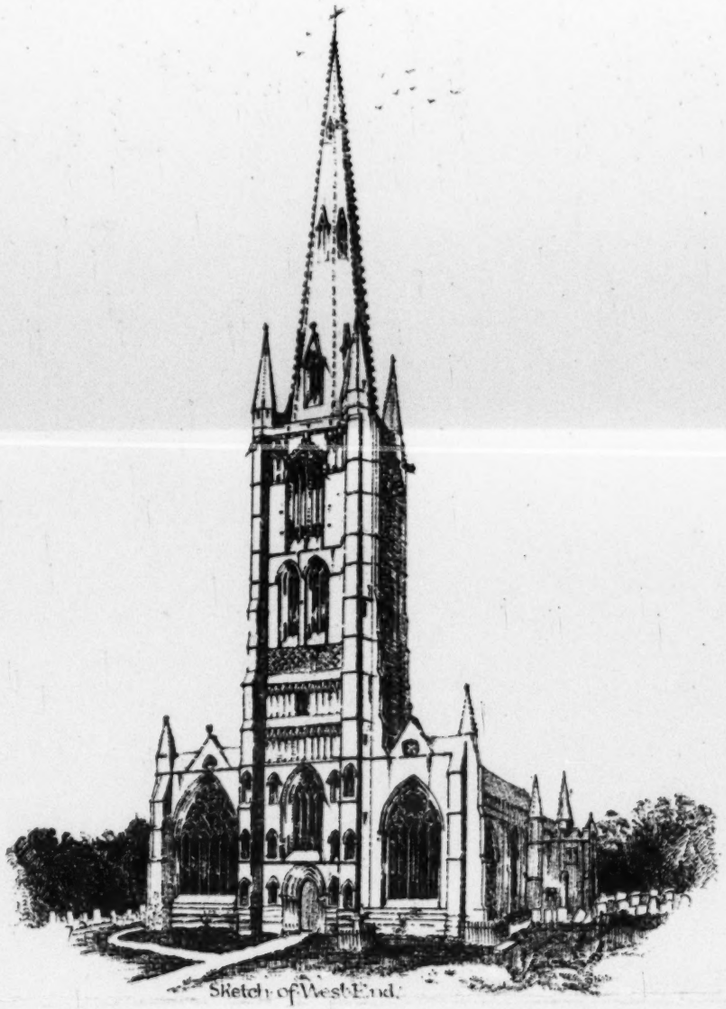
Plan of B

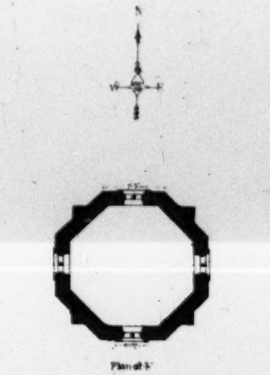
ENTRANCE DOORWAY, SCHOOL BOARD OFFICES.

MR. E. R. ROBSON, F.S.A., ARCHITECT; MR. DRESSLER, SCULPTOR; CARVED PANELS BY MR. MCCULLOCH.

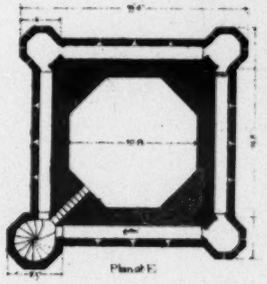




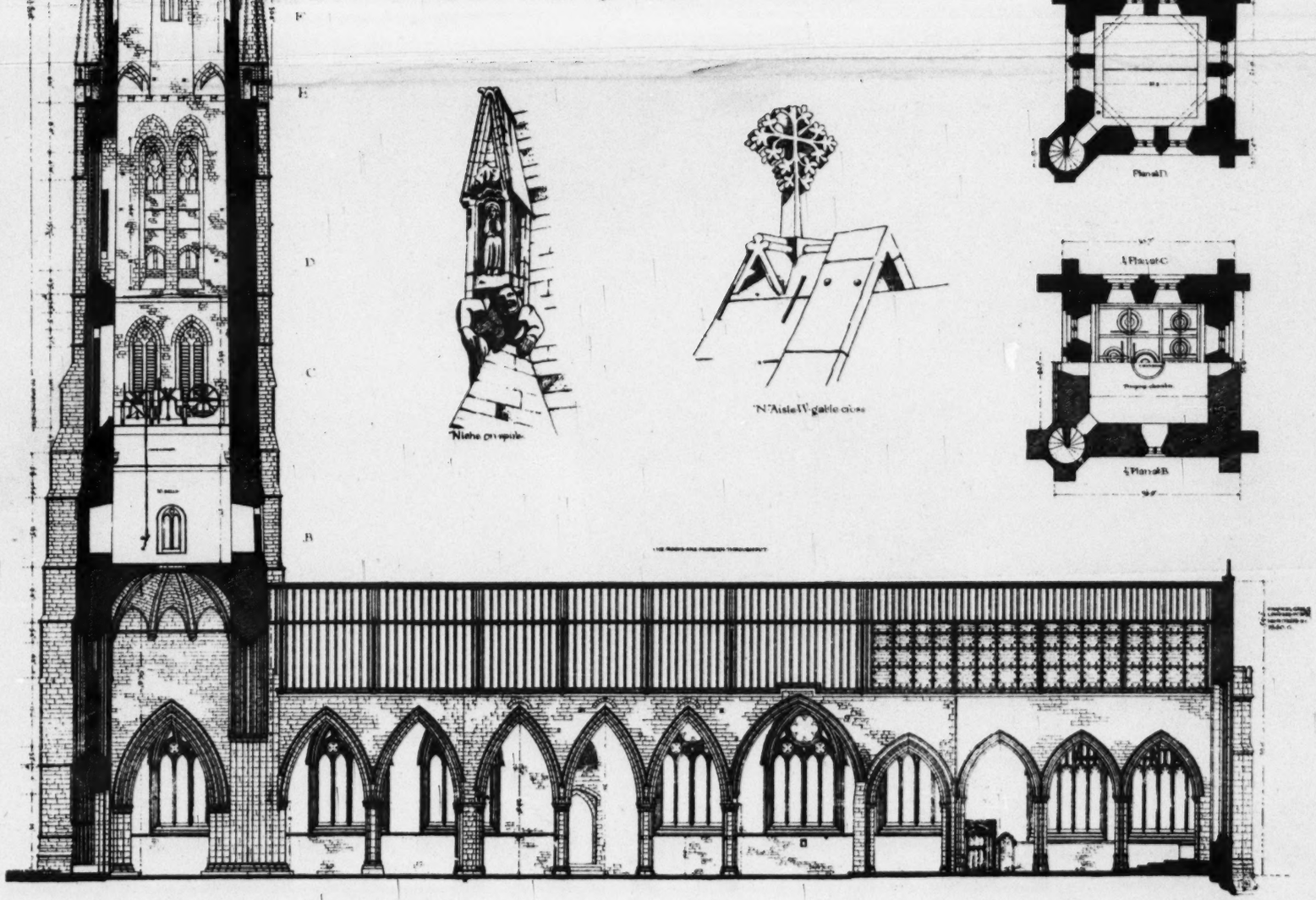
Sketch of West End.



Plan at F.



Plan at E.



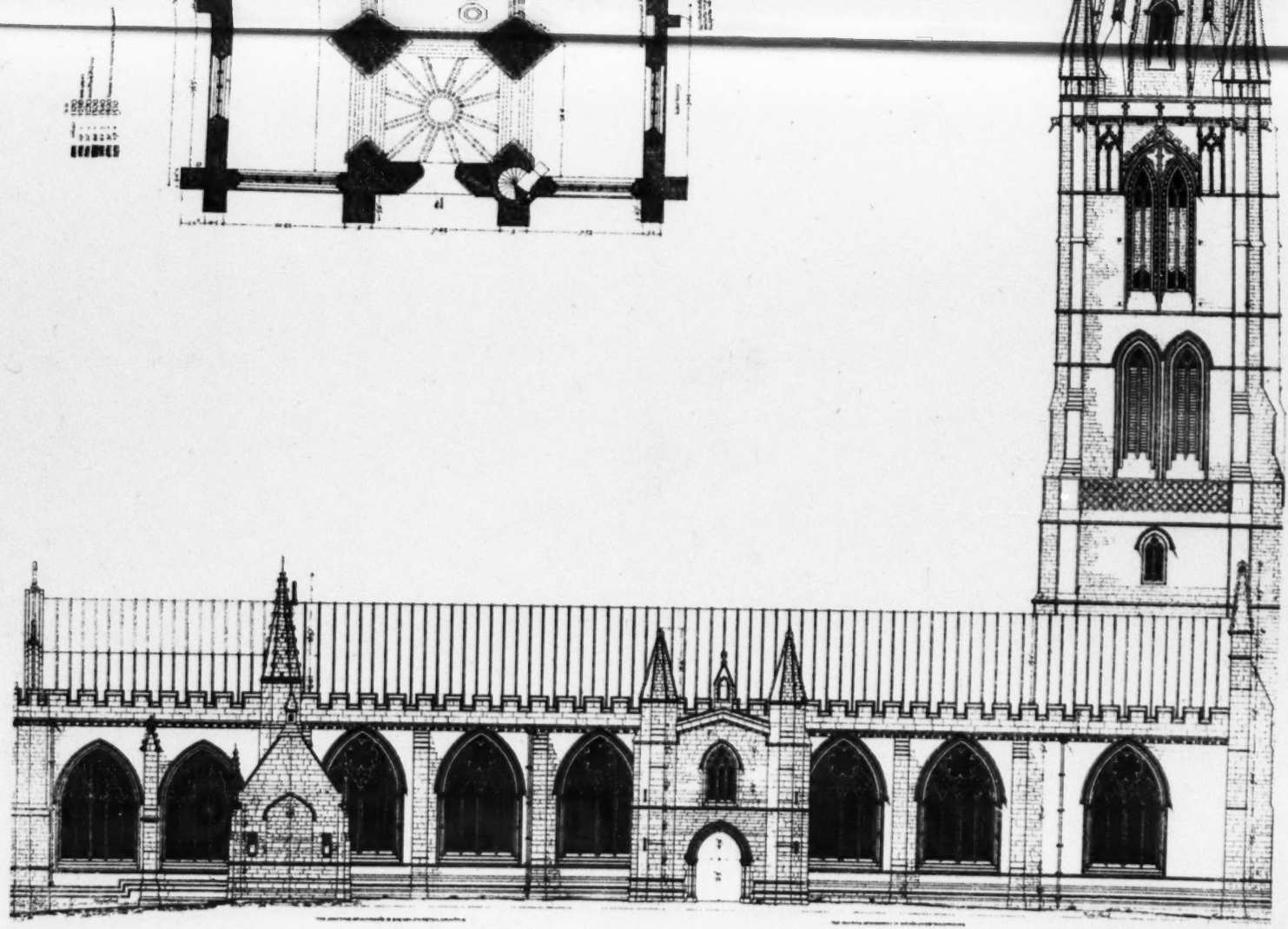
LONGITUDINAL SECTION.

PHOTO-LITHO. SPRAGUE & Co. LONDON

GRANTHAM CHURCH, LINCOLNSHIRE.—MEASURED AND DRAWN BY MR. E. H. SEDDING.

AWARDED THE INSTITUTE SILVER MEDAL AND TEN GUINEAS.

GROUND PLAN.



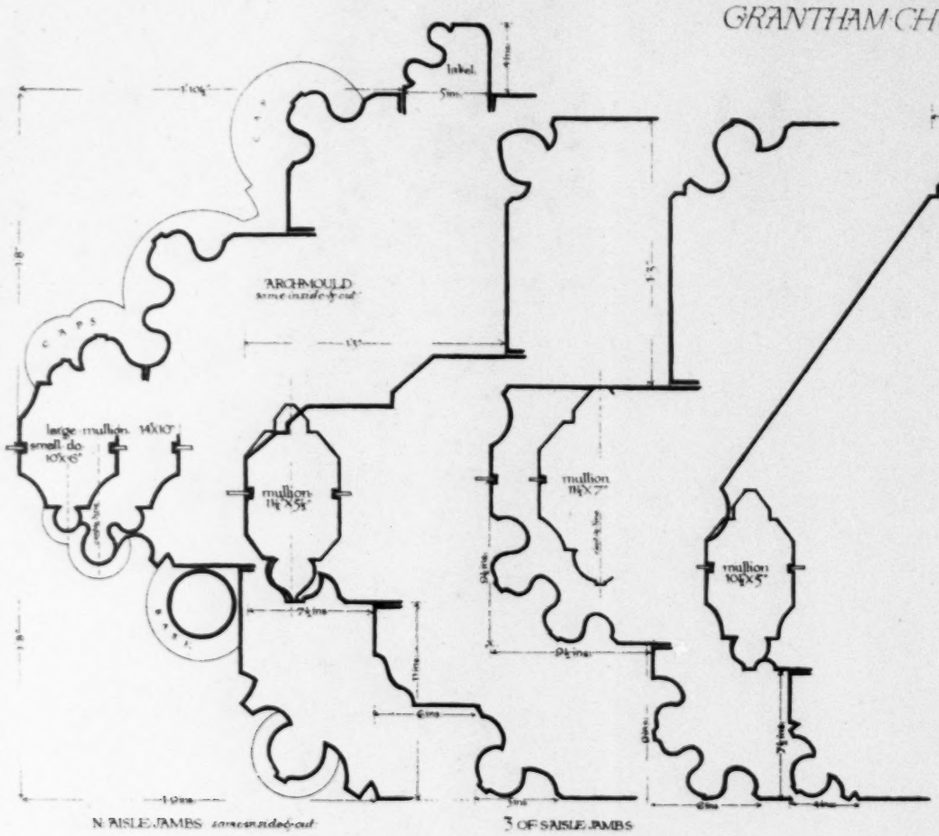
NORTH ELEVATION.

PHOTO-LITHO. SPRAGUE & Cº. LONDON

GRANTHAM CHURCH, LINCOLNSHIRE.—Measured and Drawn by Mr. E. H. Sedding.

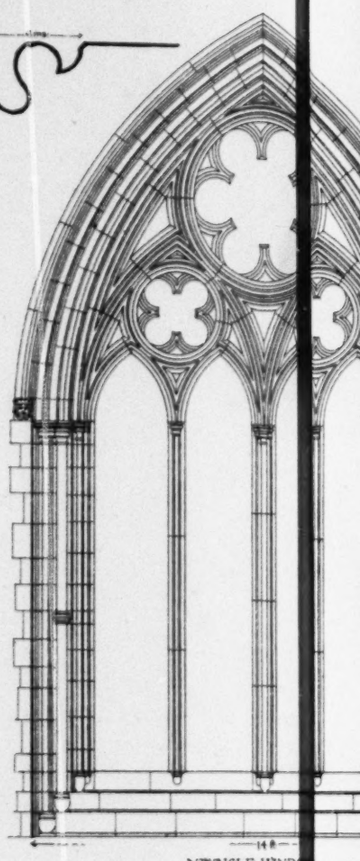
AWARDED THE INSTITUTE SILVER MEDAL AND TEN GUINEAS.

GRANTHAM CHURCH

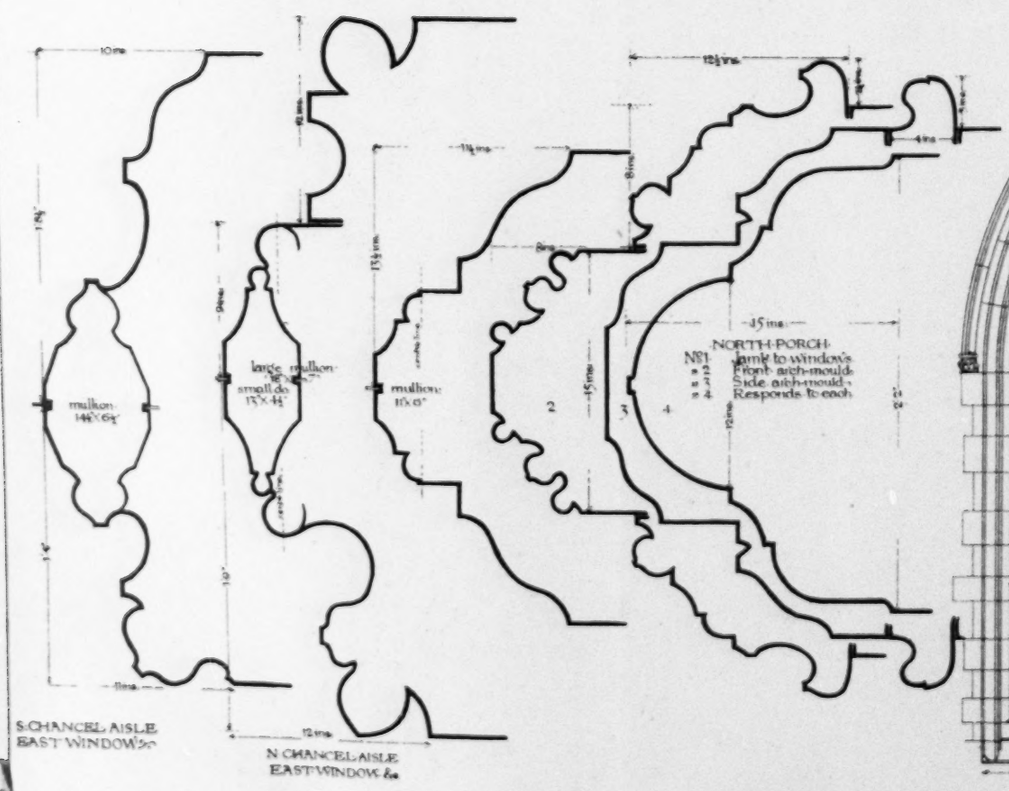


N. AISLE JAMBS same outside & out

3 OF S AISLE JAMBS

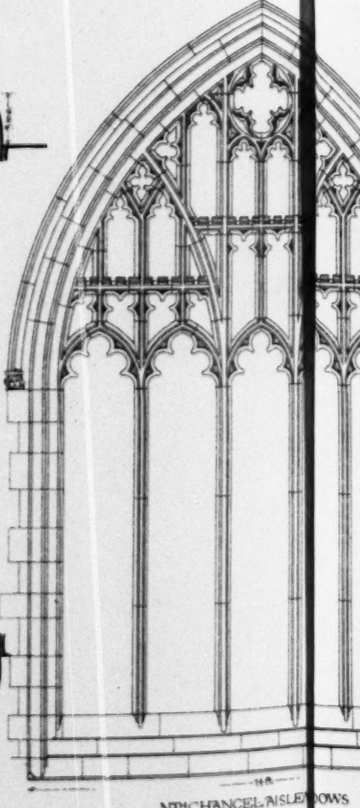


N° AISLE WINDO



S. CHANCEL AISLE EAST WINDOW &c

N. CHANCEL AISLE EAST WINDOW &c



N°2 CHANCEL AISLE WINDOWS

GRANTHAM CHURCH, LINCOLNSHIRE

AWARDED THE INSTITUTE SILVER MED

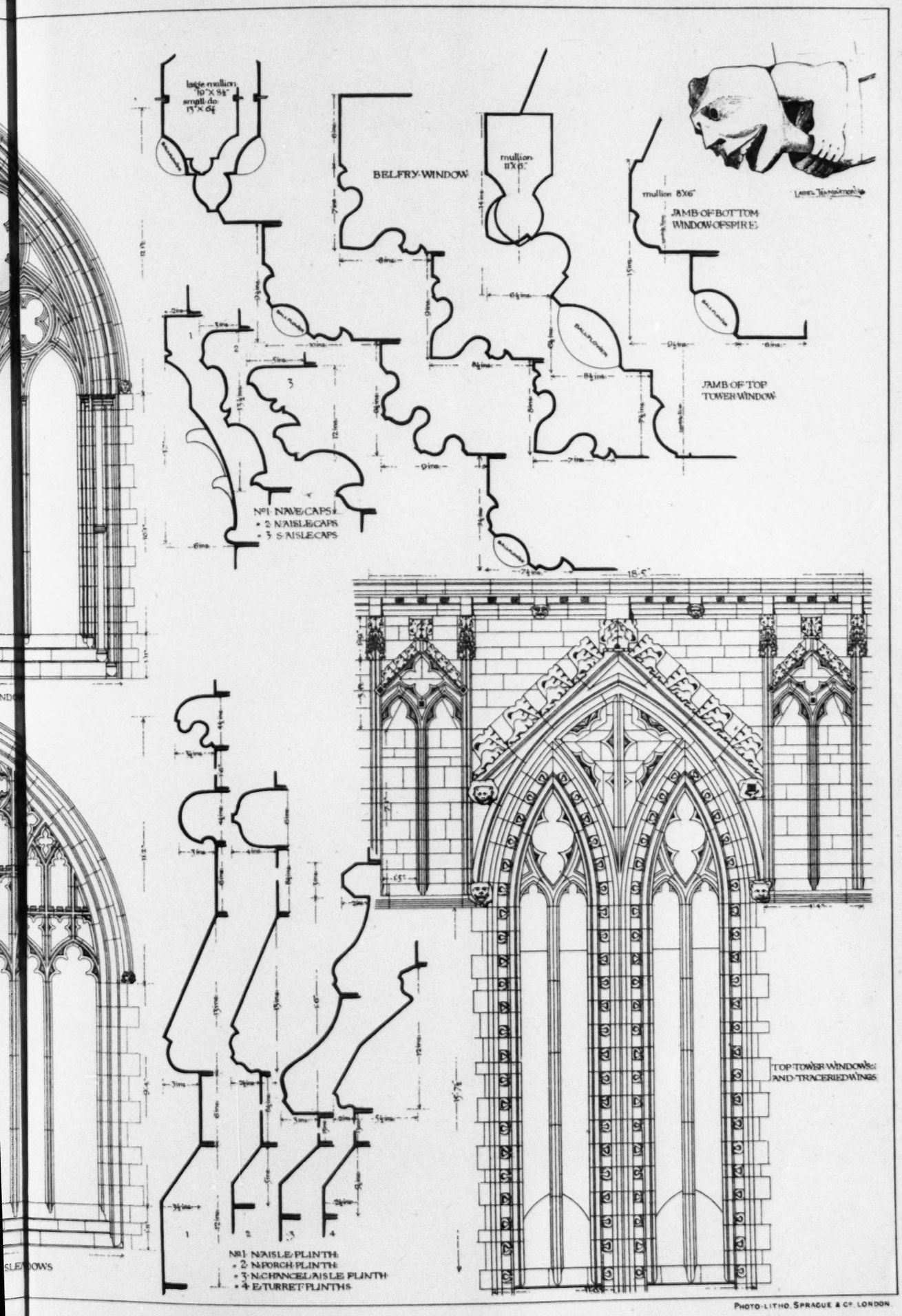
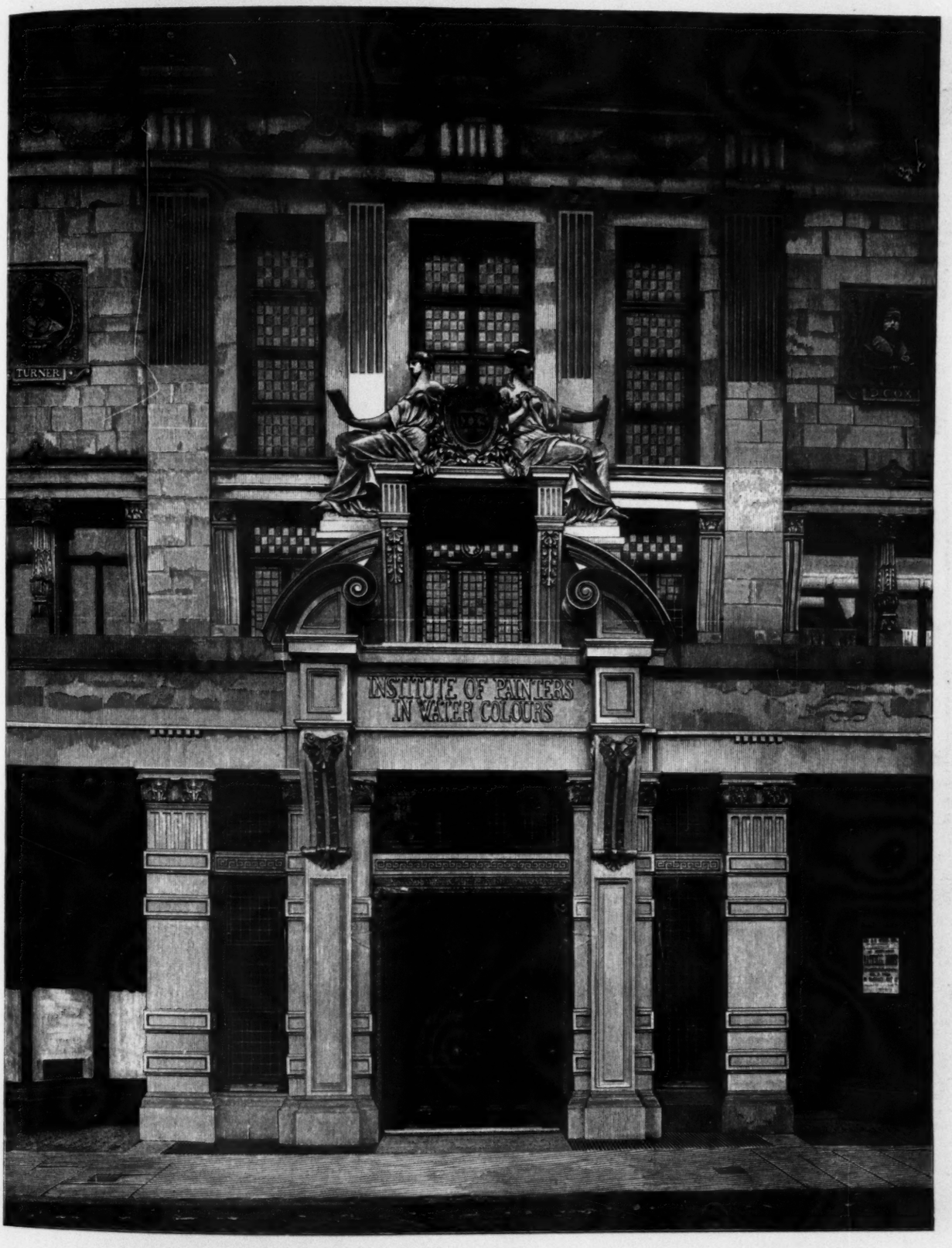


PHOTO-LITHO. SPRAGUE & Co. LONDON.

EASURED AND DRAWN BY MR. E. H. SEDDING.

SILVER MEDAL AND TEN GUINEAS.



ENTRANCE DOORWAY, ROYAL INSTITUTE OF PAINTERS IN WATER COLOURS.

Mr. E. R. Robson, F.S.A., Architect; Mr. Verheyden, Sculptor.

ARCHITECTURAL SOCIETIES.

Birmingham Architectural Association.—The sixth ordinary meeting of the current session was held at Queen's College on Tuesday evening last. The Vice-president (Mr. John Cotton) was in the chair. A paper was read by Mr. T. Camm on "Old Stained Glass," which was very fully illustrated by examples taken from various cathedrals and churches at home and abroad. In addition to the different phases of the Mediæval art, the lecturer entered into the methods of modern manufacture, and made a statement to the effect that stained glass could be produced in this country to equal both in colour and form that of the Middle Ages. A lengthy and interesting discussion followed at the close of the lecture. A vote of thanks, proposed by Mr. W. Churchill, and supported by Messrs. T. W. F. Newton, J. Cotton, and Victor Scruton (hon. sec.), was heartily accorded to Mr. Camm for his paper, and after a response from that gentleman, the meeting terminated.

Leicester and Leicestershire Society of Architects.—On Wednesday, the 3rd inst., the President, Mr. Everard, entertained at dinner at his house, Woodville, near Leicester, the members of this Society. Thirty-two members, including pupils and assistants, responded to his invitation, and the Mayor of Leicester honoured the Society by his presence. After the loyal toasts, Colonel Millican responded for the Volunteers, proposed by Mr. Goodacre. The Mayor, Mr. Hart, replied for the town and trade of Leicester, proposed by Mr. W. Jackson. Mr. Everard proposed the toast of the evening, "Architecture and the Royal Institute," which was acknowledged by Mr. Goddard, and the Chairman's health was then toasted with acclamation and musical honours.

Northern Architectural Association. — The annual meeting of this Association was held in the Old Castle, Newcastle-upon-Tyne, on the 2nd inst., when the following additions were made to the roll of members: — Members, Messrs. W. S. Hicks, A. B. Plummer, and John Smith. Associate, Mr. James T. Cackett. Students, Messrs. Wm. P. Brewis, J. A. Bryson, R. B. Dick, Alex. Drysdale, W. H. Dunn, jun., N. C. Hinton, C. J. Marshall, E. Rich, and G. J. Wilson. The election of officers for the coming session was also proceeded with, with the following result:—President, Mr. G. G. Hoskins. Vice-Presidents, Messrs. E. Shewbrooks, and W. Glover. Hon. Treasurer, Mr. W. L. Newcombe. Hon. Sec., Mr. F. W. Rich. Committee, Messrs. W. H. Dunn, J. H. Morton, Joseph Oswald, Thos. Reay, Wm. Livesey, W. H. Knowles, and C. E. Oliver. Auditors, Messrs. J. Cresswell and J. T. Cackett.

Edinburgh Architectural Association. — The fortnightly meeting of this Association was held on the 4th inst., Mr. G. Washington Browne, president, in the chair. Mr. John M'Lachlan read his third paper on "Old Edinburgh Architects," going back to some of the more eminent men who lived before the end of last century. Beginning with Sir Wm. Bruce, of Kinross and Balcaskie, in the time of Charles II., Mr. M'Lachlan referred to his political services in connexion with the Restoration, and to his appointment as Master of the King's Works and Architect to his Majesty. Bruce had been brought up in the school where stately Classicism asserted its power, and his principal works were Holyrood Palace and the central portion of Hopetoun House. Dealing next with the Mylne family, Mr. M'Lachlan said they were Master Masons to many successive kings of Scotland, and they were connected with many important buildings in the kingdom. Having briefly sketched their history, he said that to Robert Mylne we owed Mylne's-square and Mylne's-court, which were designed as a protest against the narrow lanes and closes which were so characteristic of the Edinburgh of previous centuries; the same architect and builder repaired the battlements of Edinburgh Castle after its siege by the Earl of Leven in 1689; while his grandson built the old Blackfriars Bridge over the Thames, and Inverary Castle. The latter's brother William was the architect and builder of the Edinburgh North Bridge. The Adam family were also interesting in the history of Scottish architecture, and one of the most notable of its members was William Adam, who lived in the beginning of the eighteenth century, and who, among many other works, designed the wings of Hopetoun House, Dumfries House, Floors Castle, Haddo House, and the old Edinburgh Royal Infirmary. On the motion of Mr. Russell, a cordial vote of thanks was awarded to Mr. M'Lachlan for his interesting paper, and the Chairman expressed the hope that he would continue his efforts to give them some account of their professional ancestors.

ARCHÆOLOGICAL SOCIETIES.

British Archæological Association.—At the meeting of this Association on the 3rd inst., Lieut.-Col. Adams, F.S.A., in the chair, the Rev. Canon Routledge sent for exhibition a piece of Roman carving, probably one of the horns of an ancient altar, found built up in the walling of St. Martin's Church, Canterbury. It had been used as old material in later Roman times, for there are traces of mortar and pounded brick. Sir Henry Dryden sent a squeeze of the newly-discovered Saxon stone at Moulton. It is covered with interlaced patterns with a grotesque animal. Mr. Loftus Brock, F.S.A., exhibited a collection of old views of demolished buildings formerly in the City of London, illustrative of the amount of information to be derived from their study. Mr. Romilly Allen, F.S.A. (Scot.), described a remarkable horn powder-flask of Danish workmanship, bearing a late date, 1697, the curious patterns which covered it being very similar in appearance to the very early work on crosses and in MSS. Mr. R. Blair, F.S.A., exhibited a fine collection of views and sketches of little-known antiquities in the north of England, among which were many Saxon interlaced crosses. The first paper was by Dr. A. Fryer on the "Divining Rod in Ancient and Modern Times." A paper was also read "On the Roman Villa at Box," by Mr. R. Mann. Some curious pavements have been discovered, one of which is remarkable for being all but exactly similar to another found in Gloucestershire. Mr. C. H. Compton stated that the remarkable sculptures found by Mr. Grover in the Atkyns Vault, under St. Paul's Chapel, Clapham (and which were described in the *Builder* for Jan. 2 last, p. 60), had been brought above ground and were now safe in the disused mortuary.

Society of Antiquaries of Scotland.—At the monthly meeting of this society, held in Edinburgh on Monday afternoon, Dr. Arthur Mitchell in the chair, the first paper was a notice of two very fine Communion cups from Duirinish, Skye, by Professor Macpherson, Vice-President. In form and ornament they closely resemble a pair of cups in the Temple, London, and were supposed to have been presented to the parish by Sir Roderick Macleod, of Talisker. The Rev. Dr. Struthers and Mr. Law, of the Signet Library, followed with some remarks on the forms and uses of several of the vessels, especially the tall covered cup from St. John's Church, Perth, which Mr. Law considered to have been a pyx. The second paper was a notice by Mr. Cochran-Patrick and Mr. Thomas Dickson, of Her Majesty's General Register House, on the discovery of the MS. Chartulary of the Monastery of Lindore, in Fife. The Chartulary, which is of the thirteenth century, and written on vellum, was discovered in the library at Caprington Castle, Ayrshire, and was exhibited to the Society by permission of Mr. Smith Cunningham, of Caprington. The third paper was a notice by Professor Duns of an idol human head from Ecuador, now presented to the Museum by Dr. R. H. Gunning. In the fourth paper Mr. Hutcheson gave an account of a stratum containing worked flints at Camphill, Broughty Ferry, which presented some very interesting features, and from which he had made a considerable collection of flakes and cores, which he exhibited to the society. The fifth paper was a notice by Dr. J. Jamieson of the discovery of a cist with an urn at Knockankelly, Arran.

Medals.—The Society of Medallists, under the Presidency of the Hon. C. W. Fremantle, Deputy Master of the Royal Mint, has determined to offer 20*l.* in prizes for medals to be competed for by students of this and other countries. Particulars can be obtained of Professor Legros, of the Slade School, University College, and of Mr. R. S. Poole and Mr. H. A. Grueber, at the British Museum. Medals for competition should be sent to the care of Mr. R. S. Poole, British Museum, on or before the 10th May next.

COMPETITIONS.

Paisley New Congregational Church. — A meeting of the congregation was held on the 3rd inst. to decide upon an architect for the new Church to be erected in School Wynd, the present church having been acquired by the Railway Company. Four Paisley and four Glasgow architects had been invited to compete, and the committee unanimously recommended one of the designs, which was adopted by the congregation. The author was found to be Mr. John B. Wilson, of Glasgow, and he was accordingly appointed architect. The building is to be proceeded with at once.

Blackburn Poor Law Offices.—A competition, limited to the architects of the Union, was lately instituted. The Guardians appointed Mr. James Hibbert, architect, Preston, to be professional referee, and to draw up the conditions of competition. Sixteen architects applied for conditions, and six sets of designs were sent in by the following:—Messrs. Stones & Gradwell, Mr. J. W. Bulcock, Mr. W. S. Varley, Mr. H. V. Wolstenholme, Mr. James Aspinall, and Mr. T. H. Duerden, all of Blackburn. On Mr. Hibbert's report the Guardians unanimously accepted the designs sent in by Messrs. Stones & Gradwell, Blackburn. The plans are on public view during this week in the present Board-room. It is intended to proceed at once with the work, which is estimated to cost between 8,000*l.* and 9,000*l.*

New Cemetery at Armley.—The Armley Burial Board recently offered two premiums of 20*l.* and 10*l.* for the best sets of plans of a chapel, mortuary, lodge, and board-room, proposed to be erected on the site recently purchased for a new cemetery for the township of Armley. Forty-three sets of plans were sent in; those prepared by Mr. J. P. Pritchett, of Darlington, and bearing the motto "*Labor et spes*," have been placed first; Mr. Thomas Winn, of Leeds, whose designs were marked "*In perpetuum*," being awarded the second premium. The cost of the buildings is estimated at 1,600*l.*

Stretford Local Board Offices.—At the meeting of the Stretford Local Board last week, it was decided to employ Messrs. Mangnall & Littlewoods to carry out Mr. Gibbons's designs for this building. At a special meeting of the Board previously held, it was reported by the Chairman that Mr. John Gibbons, to whom had been awarded the first premium for his design for new offices, was an assistant in the City Surveyor's Office, and that Mr. C. M'Leod, who obtained the second premium, was an assistant in the office of Mr. W. T. Gunson, so that both of them were unable to carry out their designs. A protracted conversation took place as to the best course to take under these circumstances, and subsequently the Chairman and two of the councillors were requested to seek an interview with Mr. Gibbons and report to an early meeting. As the result of the interview with Mr. Gibbons, the Board decided to employ Messrs. Mangnall & Littlewoods, as before stated.

ROYAL ARCHITECTURAL MUSEUM AND SCHOOL OF ART.

THE Council, in an address to the subscribers on the work of the Museum and School during last year, say that in most respects they are able to give an encouraging report, especially as to the progress of the School, which now forms a very important part of the whole very useful Institution, the valuable collection of the Museum giving a character to the School that it could not have without it, and the School forming a means of extending the sphere of usefulness of the Museum by bringing, as during last year, nearly 200 students to the building, many of whom came to draw or model from the casts contained in it. "This is the tenth year of the existence of the School as a regular School of Art under the Department of Science and Art. Nearly a thousand students have during that time been educated in art for longer or shorter periods, some of the students having been regularly in the School for over six years; over these not only has there been the influence of a systematic art education by very unusually talented masters, more especially the head-master, Mr. Frederick Brown, well known as one of the best teachers in London, but also of the continued presence of the unrivalled historical collection of works of art, ranging from the age of the Greeks to the present time. 396 works were sent up to the Department

many of which were from the casts in the Museum, including some excellent copies in clay by the modelling class, composed of carvers, masons, and a few young architectural students, whose studies of this character are of the greatest advantage to them."

With regard to the Museum itself, the Council say:—"The Museum was founded thirty-five years ago, and was supported at its foundation by annual subscriptions and donations alone; during the same ten years that the School has increased in funds and students, the subscription list, upon which the whole Institution still so much depends, has, principally from the deaths of subscribers or from the retirement of members of firms originally much interested in the Museum, decreased from 288*l.* 18s. 7d. in the year 1876 to 159*l.* 15s. 6d. in 1885." An appeal is made for new subscribers.

The annual public distribution of prizes will take place at the Museum, Tufton-street, Westminster, this (Friday) evening, March 12.

BRICKWORK, AND THE LEANING TOWERS OF BOLOGNA*.

HAVING now considered the construction, we come to the design and proportion of the tower externally. It is a work in which nothing is meagre or vulgar, nothing clumsy or top-heavy. There is no extravagant treatment. By a nice adjustment of parts a result has been arrived at which we may call bold and simple without being crude; light without being flimsy; massive without being cumbrous. I am sorry to be able to say so little about the basement story. But it affects the present outline but little. It is, in any case, effectually concealed by the houses from all points from which the whole could be properly taken in. If these houses were away, the value of its massive basement would no doubt be evident. The next stage is built with little or no diminution in its sides. It terminates in the embattled weathering or set-off, which forms a base high above the surrounding houses. The set-off being as much as 16 in., is strongly marked, although there is no abruptness in the lines by which it is effected. But your attention must be especially directed to the diminution of the shaft of the tower and to its relation to the overhanging parapet. It will be observed from the dimensions that the parapet overhangs beyond the line of the bottom of this shaft, but it is only by 2 in. that it does so. In the photograph it would appear to be almost within this line. But some allowance may perhaps be made for the further diminution caused by the height of the lines extending beyond the proper focus of the lens. The parapet, however, is still more than 14 in. within the plinth line. The square plain drip under the battlements projects 4 in., which might seem, at that height, almost lost. Indeed, with this exception, its only relief consists really in the plain arched corbel course which carries the parapet. There are no deep mouldings, no startling or difficult projection of string-course or of cornice. The parapet, it is true, projects nearly two-thirds of its thickness, but each battlement is backed by a buttress inside, of 16½ in. or 1½ brick square, weathered off so as to thicken it out on to the solid of the wall below. The height of the arched space below the string must be about 5 ft., or a trifle more, and the splay of the corbel about 6 ft. 6 in., but I had no means of ascertaining those dimensions.

I know not if there be any tradition as to the original intent of these towers, whether they were built out of mere personal vanity, or for the perpetuation of a family name or a family feud. We will hope, however, that one chief object was that of adding a striking feature of an ornamental description to the city. It is certain that the general character of a place depends very greatly upon the style, magnitude, and outline of its permanent public buildings. It is probable that some amount of virtuous emulation led the representatives of the Garisenda family to follow the good example the following year. We can only regret that in some respects the endeavour met with so hapless a result. The height of the Garisenda Tower is said to be exactly 1 ft. more than half that of the Asinelli; but its declination from the perpendicular being in actual measurement half as much again as that of the other, its proportionate inclination is nearly three times as great, and, if continued to the same height, the top of one side of the tower would, within a few feet, overhang the plinth on the opposite side. But the subsidence in each case is not on the square, but more nearly on one of the diagonals. The towers are planned at an angle with each other, and the subsidence is somewhat towards each other. The appearance of their divergence changes, therefore, with every step you take. To make a proper perspective from geometrical drawings would fairly tax any one's powers of simple geometrical perspective, and certainly the distorted bird's-eye perspective of the Garisenda Tower, as looked down upon from the Asinelli, is very singular.

But we must turn for a moment from the purely practical; for a friend blessed with a sentimental turn of mind has insisted on my giving you a quotation from the thirty-first canto of the "Inferno," as showing its early subsidence, and as illustrating its imposing impressiveness. This appears to have suggested to the poet a grand simile for his visit with Virgil to the tenth circle, "Guilt's Last Abyss." You must excuse my not giving it in the original, but I must give you the best I can. With very slight poetic licence, the passage may be rendered thus:—

> "And then, at ease to lift me, stooping nigh
> The big Antæus tower'd in his might,
> As when one walks 'neath Garisenda's height
> His lofty battlement, athwart the sky
> Suspended, seems through fleecy clouds to fly,
> Declining fast, to crush the luckless wight
> That looks up spell-bound at the awful sight."

An examination of the foundations and surrounding soil would probably be an interesting and instructive subject of investigation if it could be made. I dare say there are men who would undertake to restore the towers to their upright position, by countersinking the higher side sufficiently to bring it down to the other. The foundation must itself, of course, be one solid mass. How far the footing spreads we have no means of knowing; but we do know how difficult it is to be sure of one's foundation on the slope of a hill of clay or of friable limestone.

I remember, many years ago, a builder telling me of a difficulty which he had surmounted in the erection of a chimney for some gasworks, by a singular and ingenious device. A chimney had been twice built, and twice it had failed. This builder then made himself responsible for its secure erection. The site was not far from the bank of an estuary, and the foundation was unequal and uncertain. The builder judged that if it must sink at all, it ought to be made, or at all events allowed, to sink equally; he therefore had a large block of granite, of several tons weight, roughly shaped into a pyramidal form. First of all this block was embedded, point downwards, at a reasonable depth, and from its upturned base was gathered out the walling to the extent required, so as to bring it still some feet below the ground at the proper base of the walls. The chimney was built, and although it subsided nearly 18 in., it sank so regularly as to keep its erect position as nearly as possible.

This brings us, in conclusion, to a more detailed discussion of our own modern brickwork. I am not now going into the various forms of bond, nor yet into the different descriptions of brickwork prevailing in various countries, localities, or ages. The size of the bricks has, as you know, varied enormously, as well as the mode of constructing them. Two centuries ago England produced some of the finest possible rubbed and gauged work. Some of this has been reproduced of late years. It is laid closely with joints of fine lime putty. But the fine facing has necessarily allowed of very little connexion with the rougher work behind it, except by the objectionable use of smaller bricks. Early in the present century it had become the custom to cover the brickwork with compo. From old letters it appears that much of this was done mainly from fashion. Even good old work was covered with compo equally with the poor rough work which this practice induced. The clean smooth surface was supposed to possess the merit and the beauty of fine dressed stone. It prevailed equally elsewhere. In England it is very fast disappearing. In Sweden the practice is deplorable. At Stockholm, last summer, I observed they are able really to produce grand effects in naked brickwork. They make this of a very rough description, having a ready resource in the compo to give it a finish, and what they would call effect. In a handsome set of flats, I believe it was, drawing towards completion, there were manifest evidences of art and of skill in the treatment as well of the masses as of the details. The grouping and the graduating of the window spaces in the several stories, the arcadings, and the deeply-recessed windows, gave light and shadow not to be found in any ordinary street in London. And life and spirit, too, were evident when you were just far enough away not to detect the offensive crudeness of the brickwork. With a little more care in the making and laying of the bricks, they would have been in advance of us. Yet they are content to reduce their work to a far lower level.

The character of much modern work is spoiled by the excessive thickness or height of the brick in proportion to its length and breadth. The actual size is of less consequence than the proportion. The size of our own bricks formerly was, of course, regulated very much by the tax on bricks, which was abolished about forty years ago, but from the effects of which we have not yet fully recovered. The brick was made of a maximum thickness and length. Its breadth is naturally a little under half its length. Its length is still practically regulated by Metropolitan and Local Building Acts and By-laws. Its length must be about 9 in. in order to work in with the thickness of walls usually described in Acts of Parliament. We have not yet arrived at 12 in. and 16½ in. as standard thicknesses for solid walls. Even if a new system be adopted occasionally for country houses the old proportions will necessarily be followed for all our ordinary urban or suburban structures. But we are now threatened with large terra-cotta facing bricks. They make a good face, but not a pleasant one. We are painfully conscious of their unpleasing repetitions, proportions, the marked uniformity of their size and colour, and of the structure of the wall made by them. It is probable that these will be available for buildings only on a large scale, where large ornamental detail can be introduced to relieve their pronounced monotony.

In strong and pleasant contrast with these is the thin brick which is now sometimes made, especially when a little time and money are available for their manufacture and use. But even ordinary brickwork must be more costly when a fine and thin joint is employed, and there can be no sufficient reason why this fine joint should be used rather than a thin brick for all ordinary purposes.

The great aim in ancient brickwork seems to have been to secure strength and mass. At the present day we aim at cheapness; and at a display of neatness of finish wherewith to disguise the economy. We are ashamed at the economy, which has become a painful necessity; and we are obliged to put the best possible face upon it.

In several particulars a very false economy has arisen from the mere following of ignorant fashion and tradition. I would speak with special reference to the construction of work almost universally in use. I mean as to the proper filling, or rather the not proper filling, of all the cross-joints and inside joints of the brickwork with mortar. At the present day each brick is carefully laid with only a small fillet of mortar next its outer edge. The bedding is sometimes done in like manner. This allows of a specious pretence of flushing up all the unfilled joints, or portions of joints, from the top. But the more closely the bricks are laid the less is the possibility of the joint getting filled by such means. The flushing at best can come but about ¼ in. below the top bed. Very curiously such work is always supposed by the bricklayer to be firmer and better than if all the bed joints were properly filled in.

It is actually argued that, like a chair or a table standing on three or four legs, so is a brick the firmer for having support only at its edges instead of being solidly bedded and jointed into one homogeneous mass. The real result is a series of cavities or pockets in the walls into which the wet is drawn or is driven, and from which, perhaps, it takes weeks to dry, and then drying out at last into the building rather than out of it. The continuous vacuum in the wall is a direct vehicle for the accumulation of wet for the saturation of the whole body of the wall. I have seen, on the south coast, rain bubbling through the inside end of the brick

* Continuation of a paper by Mr. William White, F.S.A., read before the Architectural Association on the 26th ult. See pp. 368, 388, *ante*.

header in a 9-in. wall not yet covered with its upright tile weathering. Surely as regards the keeping out of wet it must be evident that the greater the obstruction which can be provided against the wind passing through the body of the wall the better. Then, again, for inner walls and partitions, these cavity-joints greatly tend to make a house noisy. They contribute a lot of little drums to make a great reverberation; and with the slightest shrinkage or settlement, which may indeed be induced by them, we have leaky chimneys and troublesome draughts. It is true the joints allow of a little economy in the quantity of mortar. But at what a loss! They do allow of a neater, narrower joint being easily made; a little empty show at the greatest sacrifice of substance, and for the mere gratification of the bricklayer's whim in following his infernal fashion, his senseless tradition. The inevitable result is a flimsy, smoky, noisy, draughty, damp, unsanitary house. Some clerks of works, and some builders, and even their foremen, will profess to see the fallacy of the custom. But, whether they see it or not, they rarely provide any efficient remedy for it. From a long experience I can hardly believe that there is a bricklayer in England who has learned his trade in the usual way, but will stick to it, unless the reasons why it is wrong shall have been calmly and carefully pointed out to him. The intelligent British workman, supposed to inherit and enjoy the traditional experience of centuries, will still be found to follow it, and if you should venture to be a little dogmatic in your opinion as to it, he will be ready to regard you as a born idiot, ignorant of the first principles of his trade, and he will look at you as much as to say, "You, sir, may have your opinion on a matter which you know little about, but I am not going to change mine; not if I knows it." How many of you have been told, or have traced out for yourselves, the real origin and fallacy of this custom? And how did it really originate? Formerly, every cranny of the wall was well filled; every brick was well surrounded with mortar, or else with grouting. It was with the grouting, indeed, that the evil first of all had its rise. In the days of rougher brickwork and wider joints, there was no difficulty in flushing up the work with mortar or with grout. The bond will not allow you to use wider joints in the body of the wall than in the outer face, and as the finer work became the fashion, and the joints were left unfilled, it became the custom to specify careful grouting for every course. By degrees, this degenerated into every third, fourth, or fifth course. This occasional grouting being really of very little use, was still again reduced, but the narrow filleted joint was left, and it still remains to bear witness to the altered condition.

These evils are but partially remedied by the adoption of hollow external walls, to which in reality this base and hollow system has given rise. The treatment of hollow walls indeed has been much controverted. A great deal is to be said in favour of making the cavity next the outside, as there is also of making it next the inside. Some of the evils indicated may be remedied by filling the hollow space with a damp-proof concrete, or by rendering with cement against the outer face of the cavity. The cavity of air is considered of great service as a non-conductor; but if this cavity is to be filled with air supersaturated with moisture, or if streams of wet are to dribble down its interior, the benefit must be worse than questionable.

A cavity next the inside with only a 4½ in. casing and unfilled joints, is frightfully noisy in a house; and it is not firm for the support of the timbers of floors and roofs.

But I must draw to a close. If I have been able to bring before you anything fresh, or anything worth further discussion or consideration, you must thank our worthy President, at whose special request I have come forward. I can only trust that the subject may prove to be as interesting to you as it has been to myself.

Seventh Annual Exhibition of Meteorological Instruments.—Under the auspices of the Royal Meteorological Society, an exhibition of barometers, and of such new instruments as have been invented and first constructed since the last exhibition, will be opened on Tuesday evening next on the premises of the Institution of Civil Engineers, 25, Great George-street.

THE DISPOSAL OF SEWAGE SLUDGE.

ASSOCIATION OF PUBLIC SANITARY INSPECTORS.

AT the March meeting of this Association, held on Saturday last, at No. 1, Adam-street, Adelphi, a paper was read by Mr. W. Warner, C.E., of Nottingham, on "The Disposal of Sewage Sludge," Mr. Jerram, the Chairman of the Council, presiding.

Previously to the reading of the paper a proposal was unanimously adopted to support the memorial to the Local Government Board of Mr. Rees, late Sanitary Inspector at Guildford, for an inquiry into the circumstances of the dismissal of the memorialist without reason being assigned, after many years of faithful service. The Chairman pointed to the case as an illustration of the insecurity of the tenure of office of the sanitary inspector. Mr. Rees, at the age of 54, when too old to be eligible for a similar engagement elsewhere, had been suddenly discharged, apparently for no other reason than having ventured to bring to the notice of his Board infractions of the sanitary regulations by certain members of the Board itself.

Mr. Warner, after referring at the outset of his paper to an attempt to deal legislatively with the question of drainage as early as the reign of Henry III.; to the fining of John Shakspeare, of Stratford-on-Avon, in 1552, for having a heap of refuse before his house in Henley-street; and to a paper on the subject of drainage by Sir Christopher Wren, in 1678,—fixed upon the date 1855 as the commencement of the new sanitary epoch. In that year the last cesspool disappeared, and in 1858 the gigantic scheme of Sir Joseph Bazalgette was approved by Parliament, the works at the outfall of the main drainage system being opened by the Prince of Wales in 1865. The offensive and dangerous accumulations which soon afterwards manifested themselves at Barking Creek and Crossness disproved, as a Royal Commission had to admit, the theory that sewage could be at once got rid of by being discharged into a tidal river, and a great variety of inventions had been since produced for dealing with raw sewage. These inventions he divided into three classes, according to the three principles of action involved, viz., irrigation, filtration, and precipitation. Excellent results are obtained at Winchester from the irrigating process, and it is more or less successfully operating in Edinburgh, Carlisle, Nottingham, Leamington, Bedford, and some other towns; but the difficulty of finding agricultural land sufficient for a large city almost precludes the adoption of the irrigation principle in the metropolis, and various gigantic schemes for metropolitan sewage irrigation had come to nothing. The more costly filtration and precipitation processes have had to be resorted to in many towns, one of the most successful being in operation at Southampton. The method adopted there was illustrated by a large scale drawing of the works constructed from the plans of Mr. Bennett, C.E. The most important of the three principles was precipitation, in which the liquid sewage is deprived by precipitation of as great a proportion as possible of the solid matter it contains in solution and suspension, by the application of lime, animal charcoal, different alums and clays, ashes, blood, and other matters. The most conspicuous success had been achieved at Aylesbury with a process of this class, where the resultant solid product, native guano, found ready sale at 70s. per ton, and the effluent water was clearer and brighter than the drinking-water of many towns. Alum, clay, animal charcoal, and blood are used in the purifying process at Aylesbury. Good results with analogous processes are said to be obtained at Southampton, Ealing, Hertford, and Coventry. The most perfect of the precipitation schemes, that of Mr. Melliss, C.E., as carried out at Coventry, provides a bed of loamy soil wherein vegetables and roots are planted, over which the effluent has to pass after filtration by chemical agents, before it can enter the ordinary water-course. The matter precipitated, termed "sewage sludge," still contains 90 per cent. of moisture, and to extract from 45,000 gallons of it the 2 cwt. of solids they contain is a matter which has employed the highest mechanical skill and inventive genius in the country, culminating in Messrs. Fryer & Alliott's mechanical subsider. Bricks made at Leicester by Mr. Monson, and cement made at Burnley under General Scott's process, are illustrations of other purposes for which the sludge is utilised. From the purely sanitary point of view, the "Destructor," in which the residuum is destroyed by fire, is the most to be recommended. The plan adopted at Ealing under Mr. Jones, C.E., is to pump the sludge into dams containing house refuse, and to burn both in the fiery furnace of a "Fryer's Destructor." The latest developments of mechanical invention have been devoted to a combination of the precipitation and the filtration principles. The invention of Bowing's filter press for yeast and other residues of breweries suggested forms of sewage filter presses which Messrs. Manlove, Alliott, & Fryer, of Nottingham, have successfully produced. According to the calculations of Mr. D. K. Clarke, C.E., each of these presses will treat four times as much as the older forms of press, and twenty of them will suffice for the whole of the sludge of the metropolis, which amounts to 4,000 tons every day. Alliott's sewage-sludge apparatus, recommended by Mr. Lacey, town surveyor of Brentford, after a careful inspection of all the processes in use, is expected to be in operation in a few days.

In the course of the discussion that followed the reading of the paper, further details of the process carried out at Southampton were given by Dr. Angell and Mr. Bennett, who had accepted an invitation to be present at the meeting for the purpose.

Dr. Angell said that during the past year their efforts at Southampton had been mainly directed to getting rid of lime in the purification process. The effluent produced by lime was extremely fœtid and favourable to the development and the support of bacteria, which evolved the foulest forms of gas. The lime effluent passed through some very offensive phases, the trouble not being observed immediately on being discharged into the stream, but beginning three or four miles down the river. The materials substituted for lime at Southampton contained what was called occluded oxygen, and the results obtained had been almost marvellous. The filter presses were marvels of skill, but they did not turn out a substance which was of much use afterward. The resultant cakes in the Southampton process were saleable at 15s. per ton, but unfortunately the time when they were most anxious to be rid of the stuff was just the time when the farmers were the least in want of it. They had to destroy 4,000 tons of it in the summer, and from a purely sanitary point of view he admitted that to burn it was the only proper way of dealing with the sludge.

Mr. Bennett, C.E., gave some explanations with regard to the details of the process adopted at Southampton. It was a combination of several systems. They employed the carbon process for precipitation, Shone's ejector, and finally the destructor.

The chairman and several inspectors took part in the discussion, and a vote of thanks was accorded to Mr. Warner and to Messrs. Angell and Bennett.

WOODWORK.

SIR,—I am very much interested in Mr. Cruickshank's letter [p. 390, *ante*] about the woodwork at Beaufort Castle. The few observations I was able to make in my lecture would teach little to those who have made a careful study of the subject, but,—thanks to the *Builder*,—they have penetrated far, and may increase the interest in the treatment of timber which the Carpenters' Company desire to promote.

Modern conditions tend to make the joiner into a machine. The best work he has a chance of doing in the matter of framing is to put together a door with flat narrow panels and heavy bolection mouldings, and to hang it between jamb-linings and architraves of the most commonplace and mechanical-looking sort. Machinery can do most of this work, and anybody can do the rest. It can be done anywhere and brought over here, so that when the system has reached perfection our joiners will be little more than "fixers." Now there is a vast and little-trodden field for talent in the design and making of a door. What woods shall we use in the different parts and of what substance? How shall the panels be designed, how joined, and with what mouldings round them? The treatment of the door-jambs will give rise to a dozen interesting questions. Few things are so constantly seen or give such solid satisfaction as a handsome door-

way, internal or external. I was once so struck with the appearance of a* Dutchman's front door as to forget that I had rung his bell: so he caught me making a sketch of the panels, which were an inch thicker than stiles and rails, raised with a fine bold ogee curve instead of the ordinary splay, and with a nice moulding on the rising. I have drawn dozens of doors on the Continent and hardly recollect one without a raised panel. It is the same with our old panelled doors and such as are still made in old-fashioned places in this country. We can get the best of such work done here now, but the cost scares us.

It is in the village workshop and on large estates that young joiners and carpenters are most likely to find time and encouragement to perfect themselves in skill of hand and to become accomplished in the management of timber in every stage. Where they can get books and papers treating on such subjects, and particularly if they are within the influence of a class in connexion with the City and Guilds of London Institute, they may have all the advantages of Town training unalloyed. I should think also that a good deal of the money that is now being sent out of the country might find a temporary lodging in their pockets. I have just been shown some specimens of architectural carving in oak with the offer to have my own wood sent over to a small Swiss town to be carved to my own design and returned on reasonable terms. I never saw a "Crofter," but I have seen and admired a good number of Swiss village workmen, and I do not think there is anything so very particular about their brain or muscle that he need fear to try his skill against theirs.

THOS. BLASHILL.

SEWER VENTILATION.

SIR,—In a recent issue your contemporary, the *Lancet*, favoured the public with its opinions on this important subject.

After severely criticising the many foolish notions prevailing, the writer suggests that all sewers should be ventilated by 4-in. pipes, carried up "as perpendicular as possible," above the roofs of the adjacent houses. If it is intended to carry up the pipes from the centre of the streets, this, no doubt, would have an imposing appearance.

I quite agree with the *Lancet* that a great deal of ignorance prevails on the subject. In my humble opinion, sewer-ventilation, as generally spoken of, is all nonsense. Thorough aëration by surface-grates at frequent intervals, and a perfect system of flushing, has, in almost every case within a long and varied experience, prevented the generation of the gas altogether; and I contend that this is the only solution of the difficulty. If space permitted, I should be glad to give some practical illustrations, but will content myself by protesting against the system of keeping fresh air out of the sewers and attempting, by impossible pipes, to get rid of noxious sewer-gases, which ought never to be generated.

SANITARY ENGINEER.

March 4th, 1886.

PLUMBERS' WORK.

SIR,—Will you kindly allow me, as a general foreman, to reply to "A Practical Plumber" [p. 390, *ante*], whose experience of us must have been either very limited or unfortunate, and whose cool request for yet another trade privilege is so singularly ill-timed.

Your correspondent overlooks the fact that the trade to which an *efficient* general foreman has been brought up is but one of the many things that he has to know, and does know. General foremen, as a rule, are not plumbers, and although probably they cannot wipe joints nor make bends, they are capable of superintending plumbing, and certainly know when it is or is not efficiently executed.

I have known men who, after acting for a short time as plumbers' labourers, have by some means obtained work with the tools, and suddenly blossomed forth into full-blown and full-moneyed plumbers, while yet hardly knowing the right end of a trap. Is it to such a man that architects are to issue instructions, in preference to one who, in all probability, has, before becoming a general foreman, acted for several years as deputy foreman, and has therefore been thoroughly educated in the manifold duties required to be performed by him? Carry a "Practical Plumber's" impracticable suggestion to a logical issue, and its absurdity is at once apparent. If the general foreman is incapable of directing the plumbers, he is equally incapable of directing the men of any trade other than that at which he worked, and an architect must, on each of his jobs, act as the builder's general foreman.

If your correspondent would kindly condescend to emerge from the density of mystery in which plumbers from time immemorial have contrived to enwrap themselves and their trade, and to descend from the lofty pinnacle from which they are accustomed to look down upon their fellow-workmen, and would answer the pertinent questions so ably put to them in your columns by "C. A. M. B.," he would do much good, and would considerably enlighten us.

I agree that plumbing generally costs more than it ought to do, but the remedy lies in a direction contrary to that which he indicates, and I propose, with your permission, to refer to this branch of the subject in your next issue. G. W.

March 10th, 1886.

LADY ARTISTS.

SIR,—I notice a remark in your issue of Feb. 27 [p. 329], "Men and women who paint with real power are completely on a level now; there are no 'female disabilities' of any kind." This is not entirely accurate. The Society of Painters in Water-Colours (which you proceed to speak of) still maintains its rule that "no Lady Associate shall *in any case* become a full member." Surely it is time that this absurd anachronism should be reformed?

March 4th, 1886. W. W.

*** We were certainly not aware of that; if it is correct, the sooner the Society alter such an absurd rule the better. The works of one lady, Mrs. Allingham, are among the chief attractions of their exhibitions, and those of the late Mrs. Angell were equally so.

The Student's Column.

OUR BUILDING STONES.—I.

THE importance of bringing science to bear on the selection of stones for our large public and private buildings is manifest to all who have had to deal practically with the subject. The questions that at first arise are as to what sciences are necessary, and what parts of them particularly apply to it.

The principal object of these articles is to supply material for the outline of a study of the causes which affect the decay of stone, in order that the student may be able to judge of the difference between good and bad building stone, and the selection of stone for particular purposes.

To begin with, after noticing briefly the action of the atmosphere on ancient buildings, we shall pass on to describe the various agents which attack and destroy stone. The artificial methods which have been employed to test the quality and durability of building stones will next be treated of, after which the use of the microscope will be explained in examining them.

A brief description of the common minerals found in the stones, together with their general characters and method of decaying, will be followed by an account of the origin, chemical composition, specific gravity, mode of decomposition, and other characters of some of the principal granites, sandstones, limestones, flags, and slates used in this country for building purposes. The more prominent stones used for ornament will also be described.

The next part will be devoted to the various ways of selecting stone for building, by pointing out where to look for defects and the means of detecting them. The position of the building with reference to the agents which particularly affect the locality, together with some remarks on the best modes of placing stone in building, in order to counteract these deleterious agencies, will then claim attention. The methods which have been employed in hardening stone artificially; and some account of the principal and tried artificial stones, their durability, adaptability for construction and uses as internal ornaments, will form the conclusion.

Much of the work will necessarily be theoretical. Without practice, however, this theory is of little use, and although pointing out the manner in which the theory can be put into practice, the author cannot supply the practical part itself. This rests entirely with the student. No amount of reading can possibly teach anybody the mode of selecting building stones; pieces of the stones themselves must be obtained and studied. How and where to obtain samples of the stone will be pointed out when treating of the examination of stone.

BUILDINGS OF THE ANCIENT AND MEDIÆVAL PEOPLE.

The ordinary dwelling-houses of the ancient Britons were made of wood and thatched with grass. We learn from Diodorus Siculus, who wrote in the first century B.C. that the Britons used to store their corn in excavations made in the ground; and this is fully borne out by the numerous remains of these underground repositories, found more particularly in Kent, Essex, and Wiltshire. There can be but little doubt that they also lived in these holes, at least during certain portions of the year, or during a time of danger.

If, however, we may judge from some of the monuments said to have been raised by the Druids, we find that these early people understood the art of working stone for building purposes to some extent.

Stonehenge is an example of this; the trilithons there bearing unmistakable signs of having been rudely shaped and fitted together. When we come to consider the very primitive tools which they must have used in the work, it is marvellous that they should have accomplished such a difficult task. If we may judge from the way in which work is executed by uncivilised people in other parts of the world, the process must have taken a considerable time. The Sarsen stones used in the construction of Stonehenge from their nature are exceedingly durable. They are, no doubt, the remnants of a tertiary deposit and have resisted the action which caused their surrounding rock, when *in situ*, to decompose and disappear.

Roman masonry was principally of two kinds. The first consists of tiles or flat stones alternating with bands or layers of pebbles or small stones imbedded in mortar. The other variety consists of walls formed of square stones or ashlar, and the interior of rubble imbedded in mortar.

They seem to have discovered at an early period the means of counteracting the destructive action of the atmosphere on their mortar, for we find that after 2,000 years it appears to have undergone little or no change. The Romans understood what does not seem to be comprehended by some modern builders, that, if the work is to be of a durable character good mortar must be used. The remains of Roman architecture in Britain, however, show us that the workmanship in general was inferior to the buildings executed by them on the Continent. The stone, however, employed in building parts of the Roman Wall is of a very durable character, the peculiar tooling or broaching being quite distinct at the present time.

Many of the works attributed to the Saxons were partly constructed with Roman bricks and tiles. They appear to have tried to imitate Roman work on their capitals, though sculpture is seldom attempted on their doorways.

Illuminated Anglo-Saxon MSS. exhibit "the long and short work" and other distinctive features of the architecture of the period, of which there are examples at Earl's Barton Church, Northamptonshire; Sompting, in Sussex; Repton, in Derbyshire; Jarrow, and Monk's Wearmouth; and in the crypts of Ripon and Hexham.

The principal object in view in speaking of the existing examples is to enable the student to see how the stone has lasted in these early buildings. It is necessary, of course, to ascertain which parts of the edifices refer to the respective periods. This, as will be seen, has to some extent been made easy by pointing out the particular parts of the buildings which refer to the period under consideration.

A very useful list of ancient buildings, with the state of their preservation, may be seen in Gwilt's "Encyclopædia," pp. 470–478.

We have good evidence for believing that the architects of the Middle Ages exercised care in selecting the stone used in their substantial edifices. Amongst other things, we know that Caen stone was brought from Normandy, being held in high repute by them, and was largely employed. We may specially notice that it was used in the Temple Church, and parts of Winchester and Salisbury Cathedrals.

Stone derived either from Normandy or England was not uncommonly employed in Ireland, in structures of the eleventh and twelfth centuries.*

The art of stone-cutting appears to have reached its highest development at the commencement of the sixteenth century; the works of this date exhibiting a perfect mastery of the subject.

About the beginning of the seventeenth century the celebrated Portland stone began

* Wilkinson's "Ancient Architecture of Ireland," pp. 84, 85.

to be generally used. The various important buildings constructed with this and other well-tried stones used in buildings of subsequent date, will be treated of when the stones themselves are described.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

2,404, Ventilating Buildings, &c. G. F. Harrington.

In arrangements for supplying fresh air to the spaces to be ventilated, self-revolving cowls provided with vanes to cause them to face the wind are employed, and may be of a swan-neck form, with mouths of about double the area of their throats. When employed to ventilate drains the cowls are made of a special shape. They are trapped with oil to prevent the escape of wind between them and their shafts, which lead to the spaces to be ventilated.

3,352, Supporting Window Sashes. F. Howcroft.

A wooden roller rests between the edge of the sash and a curved strip of metal pivoted at its upper end, and pressed toward the sash by a spring. When the sash is raised the roller rises and allows it to slide freely, but when the sash is released the roller is pressed against it and holds it. The strength of the spring is adjusted by means of a clip.

11,425, Wood-planing Machines. J. Dent and J. Holt.

Scrapers are formed from a thin plate of steel, and are clamped between metal plates. These scrapers are pressed against the rollers of the planing-machine, and clean them while the machine is in work.

13,493, Manhole Cover for Drains. H. McColley.

The cover has a bevelled edge, and is provided with an annular vertical projection, which drops into a groove filled with glycerine.

14,120, Door Furniture. J. Walker.

In the form known as Mace's door furniture an improvement is introduced. A rose is stamped from a circular blank, and a central hole made in it; the edges of metal round the hole are raised up and finally pressed down on the rim of the barrel spindle.

15,908, Closing Doors. R. S. Moss.

Permanent magnets are used to close and keep closed doors, &c. A magnet is bedded in the jamb, and a piece of steel attached to the door, so that if the door be nearly closed the attraction of the magnet will shut it.

16,781, Window-sash Fastener. J. Walker.

An arm turns on a pivot on the meeting rail of the sash in the usual manner. A projection on its underside engages in a slot on the slide, and which is drawn across the joint when the arm is pulled forward.

NEW APPLICATIONS FOR PATENTS.

Feb. 26.—2,787, A. Pilling, Latches or Locks for Doors, &c.—2,789, D. Swan, Pigments.—2,803, T. Panario, Overflow Pipes for Syphonic Cisterns.—2,830, F. Lambert, Letter Boxes.

Feb. 27.—2,841, A. Pilling, Self-closing Doors.—2,846, R. Baird, Frames and Sashes of Windows.—2,850, H. Owen, Chimney or Ventilator Top.—2,861, T. Panario, Water-waste Preventer.—2,872, R. Thomas and P. Smith, Window Fastenings.

March 1.—2,896, W. Ross, Water Waste Preventers.—2,923, W. Martin, Fasteners for Window Fasteners.

March 2.—2,949, J. Sowden and W. Cowan, Hinges.—2,957, J. Cundall, Attaching Door-knobs to Locks and Latches.—2,961, J. Davis, Fanlight Fasteners.—2,967, J. Hicks and C. Tight, Levels.—2,983, A. Boult, Ventilators.

March 3.—3,002, J. Fletcher, Intercepting Traps for Sewers.—3,003, J. Fletcher Ventilating Covers for Sewers.—3,006, H. Watson, Water Taps.—3,012, W. Hill, Balancing Window Sashes.—3,019, G. Buffham, Ventilators for Windows.—3,037, J. Halley, Artistic Exposing and Erecting of Gas Pipes throughout Buildings to form Picture Rods.—3,040, J. Hampton, Cramps or Clamps.—3,044, C. Kite, Ventilators.

March 4.—3,073, E. Cheetham, Connecting Pipes.—3,102, T. Weekes, Portland Cement.—3,106, H. Jensen and Others, Electric and Magneto Bells.

PROVISIONAL SPECIFICATIONS ACCEPTED.

6,748, V. Schneider, Automatic Water-waste Preventers.—799, G. Hurdle, Wall or Ceiling Ventilator.—1,036, E. Hawks, Screws, &c.—1,075, A. Deas, Service Cisterns and Valve for Water-closets.—1,086, F. Wendling, Paint.—1,088, H. Hunting and A. Telfer, Mortising and Dovetailing Machines.—1,126, C. Alison, Cements or Plasters.—1,156, J. Burt, Securing Knobs or Handles to Doors.—1,239, M. Conrath, Embossed Material for Decorating Walls, &c.—1,282, J. O'Callaghan, Securing Door Handles or Knobs to Spindles.—1,372, J. Watson and H. Moorwood, Fireplaces, &c.—1,546, A. Trud, Pipes for Drains, Sewers, &c.—1,819, A. Gates, Bakers' Ovens.—1,894, J. Brewster, Heating and Cooling Buildings.—1,913, E. Shorland, Chimney and Ventilating Cowls.—11,029, G. Grove, Cooking Range.—15,088, M. Buckner, Windows.—15,741, J. Buchanan, Locks.—905, T. Young, Door-lock Spindle.—1,089, A. Shaw, Water-closet Cisterns.—1,218, C. Glossop, Basin for Drain Gullies.—1,233, W. Bartholomew and E. Reynolds, Flushing Syphons.—1,243, A. Fould and P. Genreau, Refractory Bricks, Tiles, &c.—1,319, J. Pickstock, Excluding Rain, Dust, and Draughts from Doors and Windows.—1,332, E. Hill, Supporting Window Sashes.—1,414, J. Haley, Glass Tiles.—1,513, T. Speight, Joiner's Bench Hooks.—1,663, T. Melvin, Floor Cloths and Tiles.—1836, J. White, Portland Cement.—1862, R. Hunter and J. Turnbull, Kitchen Ranges.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to opposition for two months.

3,273, E. Taylor, Fireplaces for Consuming Smoke, &c.—4,247, G. Crowe and W. James, Flushing Apparatus for Water-closets.—4,721, J. Fell, Pneumatic Door Check Spring.—4,751, J. Garrett, Earth Closet.—5,639, R. Hodges and F. Lilley, Adjusting Door Knobs to Spindles.—5,773, H. Yull and J. Thomson, Water-waste Preventer.—6,133, E. Cammiss, Bricks.—14,253, C. Garlick, Stench Traps.—1,091, J. Peckover, Stone Saws.—1,168, D. Winter, Automatic Door Closer and Check.—6,121, J. Weston, Door Springs.—6,748, V. Schneider, Automatic Water-waste Preventers.—6,849, J. Denny, Bricks, &c.—7,348, W. Riches, Hinges.—8,339, A. Edmondson and Others, Step Ladder Hinge.—1,185, A. Boult, Syphons for Flushing Cisterns.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

MARCH 1.

By R. TYDEMAN.

Islington—23 and 27, Cleveland-road, 66 years, ground-rent 9*l.* £795

MARCH 2.

By VENTOM, BULL, & COOPER.

West Kensington—27 and 29, Glazbury-road, 90 years, ground-rent 13*l.* 1,620

81, 83, and 85, Talgarth-road, 90 years, ground-rent 25*l.* 2,200

By F. JOLLY & CO.

Whitechapel—10, Leman-street, Freehold 1,350

By H. RUTLEY.

Lee—46 and 48, Turner-road, 70 years, ground-rent 7*l.* 600

By L. FARMER.

South Hampstead—116, Belsize-road, 68 years, ground-rent 8*l.* 400

By W. J. NEWELL.

Lewisham—18, Evelyn Terrace, 96 years, ground-rent 5*l.* 140

By DEBENHAM, TEWSON, & CO.

City—40, Cornhill, Freehold, area 770 feet 14,000

Edgware-road—No. 156, Freehold, area 3,160 feet... 4,100

MARCH 3.

By BRAY, WEBB, & CO.

Sydenham—Freehold Ground-rents, 150*l.* 18s., reversion in 93 years 3,775

St. Luke's—39, Central-street, Freehold 900

By WAGSTAFF & WARMAN.

Islington—72, Canonbury-road, 33 years, ground-rent 2*l.* 415

Tottenham—1, 10, and 12, Grove-place, Freehold ... 1,510

Islington—127 and 135, Balls-pond-road, 17 years, ground-rent 11*l.* 7s. 465

By E. & F. SWAIN.

Notting-hill—2 to 5, Heathfield-street, Freehold ... 660

MARCH 4.

By A. WALTON.

South Norwood—1 and 2, Clifton Villas, 67 years, ground-rent 16*l.* 405

Victoria Docks, Freemason's-road—Freehold Ground-rents of 42*l.* a year 929

Wightman-street—Freehold Ground-rent of 15*l.* 15s. a year 330

Springfield-terrace—Freehold Ground-rent of 22*l.* 10s. a year 470

By J. G. & A. PREVOST.

Mile End, Moody-street—A Plot of Freehold Land 100

By NEWBON & HARDING.

Canonbury—23, Petherton-road, 63 years, ground-rent 10*l.* 10s. 845

Barnsbury—29, 31, and 33, Pulteney-street, 18 years, ground-rent 15*l.* 415

Dalston—38, Blomfield-street, 51 years, ground-rent 3*l.* 220

Edgware-road—Nos. 458 and 104, North-street, 40 years, ground-rent 46*l.*, recently burned down, including policy for 700*l.* 755

No. 458, Edgware-road, 40 years, ground-rent 34*l.* 715

Stratford, Buxton-road—"The Buxton Arms," Freehold 865

Islington—137, Liverpool-road, 13 years, ground-rent 7*l.* 185

De Beauvoir Town—29, Balmes-road, 42 years, ground-rent 4*l.* 360

Commercial-road, E.—58 and 60, Charles-street, 7 years, 8*l.* 13s. 6d. 75

Plaistow—10, Beale-street, Freehold 170

By FAREBROTHER, ELLIS, CLARK, & CO.

Hackney-road—Ground-rents of 28*l.* a year, term 20 years 400

By WORSFOLD & HAYWARD.

Dover—38, Snargate-street, 46 years, ground-rent 8*l.* 350

26, Trevanion-street, Freehold 360

3 and 4, York Terrace, Freehold 540

MARCH 5.

By F. OUGHTON & SON.

Brompton-road—No. 134, with Stabling, Leasehold 550

Walham-green—30 and 32, Britannia-road, 70 years, ground-rent 9*l.* 570

By FURBER, PRICE, & FURBER.

Leytonstone—Ground-rent of 3*l.* 10s., reversion in 79 years 70

Ground-rents of 28*l.*, reversion in 66 years 620

Islington—9, Mildmay-grove, Freehold 1,350

Ground-rent of 7*l.*, reversion in 75 years 190

MEETINGS.

SATURDAY, MARCH 13.

Architectural Association.—Visit to Houses now being erected in Kensington Court. Members to assemble at 3 p.m.

MONDAY, MARCH 15.

Royal Institute of British Architects.—Mr. John B. Gass on "Some American Methods." 8 p.m.

Society of Arts (Cantor Lectures).—Mr. Boverton Redwood on "Petroleum and its Products." II. 8 p.m.

Victoria Institute.—8 p.m.

Philosophical Society of Glasgow (Architectural Section).—(1) Paper by Mr. W. Cairns on "Plumbers' Work." (2) Annual Business Meeting.

TUESDAY, MARCH 16.

Institution of Civil Engineers.—Discussion on Mr. Dugald Clerk's paper "On the Explosion of Homogeneous Gaseous Mixtures." (2, time permitting) Three papers will be read on "The Economical Construction and Operation of Railways in newly-developed Countries, or where small returns are expected," by Mr. Robert Gordon, Mr. J. R. Mosse, and Mr G. C. Cuningham. 8 p.m.

Statistical Society.—7·45 p.m.

Manchester Architectural Association.—Mr. John Holden on "The Duties and Requirements of an Architect's Practice." Nomination of Officers. 7·30 p.m.

WEDNESDAY, MARCH 17.

Carpenters' Hall, London Wall.—Mr. John Slater, B.A., on "Concrete." 8 p.m.

British Archæological Association.—(1) Mr. W. de Gray Birch, F.S.A., on "The Legendary History of St. Nicholas of Myra." (2) "Notes on Haslemere," by Mr. Thomas Morgan, F.S.A. 8 p.m.

Builders' Foremen and Clerks of Works' Institution.—Ordinary Meeting. 8·30 p.m.

Society of Arts.—Mr. Vincent Robinson on "Eastern Carpets." 8 p.m.

Royal Meteorological Society.—Mr. William Ellis will give "A Brief Historical Account of the Barometer," at 7 p.m., after which the members will adjourn to the Exhibition of Barometers and other Instruments, at 25, Great George-street.

THURSDAY, MARCH 18.

Society of Antiquaries.—M. Gaillard on "A Manufactory of Flint Implements at Beger, Goallennec." 8·30 p.m.

St. Paul's Ecclesiological Society.—Mr. Charles Browne on "The Knights Templars." 7·30 p.m.

Dundee Institute of Architecture.—Mr. W. Mackison on "Environment." 7 p.m.

Edinburgh Architectural Association.—Mr. Hippolyte J. Blanc on "A Few Characteristics of Scottish Ecclesiastical Architecture." 8·30 p.m.

York Architectural Association.—Mr. Walter G. Penty on "Terra-cotta." 7·30 p.m.

FRIDAY, MARCH 19.

Society of Medical Officers of Health.—Dr. Louis Parkes on "The Sanitary Condition of Poor Districts in the Metropolis, with especial reference to their water-closet accommodation." 7·30 p.m.

University College.—Professor C. T. Newton, C.B., on "Greek Myths illustrated by Fictile Vases and other Monuments." III. 4 p.m.

SATURDAY, MARCH 20.

St. Paul's Ecclesiological Society.—Visit to the Charterhouse. 3·15 p.m.

Miscellanea.

The New London Hospital Medical College.—On Tuesday last the corner stone of the new buildings was laid by Mrs. William James Thompson, the wife of the Chairman of the College Board. The college, which is being almost entirely rebuilt, is to be carried out in a free treatment of the Renaissance style, the architectural features being in red brick, the building generally being faced with yellow bricks. The building will, when the works are completed, be well fitted for the high position the college holds among medical schools, being attached to the largest general hospital in the kingdom. The library will be an especially fine room, and the extra cost of decorating it is borne by subscriptions from the staff and other friends of the college, and in future all prize-givings, &c., will take place therein. The building is being carried out from the designs of Mr. Rowland Plumbe, architect; and the builder is Mr. W. Goodman, of Hartham Works, Hartham-road, Holloway, N., who have just completed the new Nursing Home, which has been built by the hospital authorities to accommodate over 100 of the nurses and probationers. Mr. Thornhill, the surveyor to the hospital, is acting as clerk of the works.

Obituary.—Mr. G. Bouverie Goddard, an animal-painter, whose numerous works have from time to time been favourably noticed in these columns, died at his residence, on Brook Green, Hammersmith, on Saturday, the 6th inst., after a short illness, due to exposure to this bitter weather. He will be remembered best by his large picture of Lord Wolverton's Bloodhounds, which was exhibited in the Royal Academy rooms in 1875, and his "Struggle for Existence," bought from the Academy walls by the trustees of the Liverpool Walker Fine Art Gallery. His later works, "Rescued" and "Love and War," showed him to have attained a mastery over the *technique* of his art which promised him a successful career as a painter of the special class of subjects to which he had devoted his talents. He was but fifty-two years of age at his decease.

The London Parcels Delivery Company's New Offices and Stables.—A new block of buildings for the London Parcels Delivery Company, consisting of offices, stables, and vansheds, has just been erected in Rolls-place, Fetter-lane, on a vacant plot of land immediately to the west of the new Birkbeck Institute. The Rolls-place frontage is about 40 ft. in length, the premises being carried to a depth of upwards of 100 ft. northward, in the direction of Bream's-buildings. They consist of a deep basement, together with ground and two upper floors. The ground-floor portion of the frontage is carried up by massive piers in blue Staffordshire brick, the upper storeys being faced with stock brick. About one half of the area of the ground-floor is intended for offices, and the remaining portion to the rear for the Company's vans, access being obtained by a central gateway. The first floor will be occupied as stables, whilst the second floor will be appropriated as fodder-stores. All the floors, from the basement upwards, are supported on iron columns; and, as a precaution against the outbreak of fire, every floor is fireproof, as well as the roof of the building. Mr. W. S. Witherington is the architect, and Messrs. Patman & Fotheringham are the contractors. The cost of the building will be about 6,000*l.*

Extensive New Suburban Building Undertakings.— Several extensive building projects are at present in course of development in the neighbourhood of Earlsfield, Garret-lane, Wandsworth. The Maxwell Farm Estate, belonging to Magdalen College, Oxford, containing 240 acres, extending from the boundary of the London and South-Western Railway on the north, to Burntwoood-lane on the south, and stretching from its western boundary in Garret-lane to Trinity-road, and the high ground in the neighbourhood of Wandsworth County Prison, on the east side, is about to change its present agricultural character, the owners having decided to lay it out for building purposes. Between five and six miles of roads will be formed on the estate by the College authorities. It is estimated that the estate will admit of the erection of no less than 6,000 houses. On the north side of the railway an estate, having its frontage in Earlsfield-road, and stretching northwards in the direction of St. Anne's Hill and Wandsworth Old Town, has been purchased by the British Land Company, who have laid out several roads for the erection of upwards of 600 houses.

The War and Admiralty Office.—Referring to the memorial of the Institute on this subject (see *Builder* for last week, p. 367), the *Saturday Review* says:—"None too soon, but, we should trust, not hopelessly too late, the Royal Institute of British Architects has bestirred itself in the discharge of duties for which it exists, and struck a blow to save London from a great architectural calamity. The question is not one of better or worse, but of the creation or rejection of that great main avenue of London, an avenue of varied interest and of unequalled historical association, of which the eastern terminus would be St. Paul's, then Fleet-street and the Strand, then Charing Cross, and then the leafy Mall and Buckingham Palace. All these familiar names and famous spots would be, were the scheme of the Institute to be adopted, brought into one street. Is this an occasion to palter and huckster?"

Woodworking Machinery.—Messrs. A. Ransome & Co., of Stanley Works, Chelsea, have sent us their new illustrated catalogue of patented and improved woodworking machinery manufactured by them. It consists of upwards of 200 pages, and is very fully illustrated. The letterpress descriptions are copious and clear, and the catalogue will certainly be of great assistance to intending purchasers and users of woodworking machines, which are now exceedingly numerous and varied in their powers. The catalogue will be found very useful for reference in builders' offices.

The Hyde Park Corner (New Streets) Bill.—In the House of Commons last week this Bill was read a second time and referred to a Select Committee. Mr. Leveson-Gower, in moving the second reading of the Bill, explained that the necessity for its introduction had been brought about by the changes which were made at Hyde Park-corner in 1883. Usually new streets were maintained by the parish in which they were situated, but in the present case difficulties arose.

Voussoir Arches.—At the Students' meeting of the Institution of Civil Engineers, held on Friday, 26th ult., Mr. W. H. Barlow, F.R.S., past-President, in the chair, Mr. H. A. Cutler read a paper on the "Stability of Voussoir Arches." The author asserted at the commencement that the mathematical analysis of stresses, though more strictly accurate, is in most cases so complicated that the graphic method is preferred, not only for its simplicity and expedition of solution, but also for the readiness with which errors may be detected by it. The factor of safety required in practice so limits the application of theory that rigid accuracy in the determination of stresses is unnecessary. The tenacity of mortar being disregarded, the voussoir arch is not capable of resisting a bending moment, and may be considered as hinged at every bed joint in the arch ring. To investigate the stability of an arched structure by the graphic method, it is first necessary to find the correct curve of equilibrium for the dead load, or weight of the structure, and then assume the live load acting on one half the arch, while the remaining half is unloaded, and to construct a second curve, both of which should satisfy certain conditions. In voussoir arches, in almost all cases, both the dead and moving load may be considered as acting vertically. When the curve of equilibrium does not fall within the arch-ring a bending moment is produced, tending to increase the curvature of the arch lying inside the neutral line, and to diminish it if lying outside. Voussoir arches not being capable of resisting a bending moment, the condition to be fulfilled is that the curve of equilibrium must practically coincide with the neutral line. The arch would not collapse so long as the curve was everywhere within the depth of the arch-ring, but when close to the edge nearly all the strain is taken through a small portion of the voussoir. Prof. Rankine limited the curve of equilibrium to the middle third of the arch-ring, which may be accepted as a simple practical rule. The curve of equilibrium is found by fixing the points in the curve somewhere within the middle third, at the crown and springing. If the deviation of the curve from the neutral line be not within the limit at every other point, either the loading, the curve of the arch, or the depth of the voussoir must be altered.

The London Sewage Question.—At the meeting of the Metropolitan Board of Works this Friday, March 12th, the Works and General Purposes Committee will present a report detailing the several steps taken for the precipitation and deodorisation works in connexion with the metropolitan sewage, and recommending that letters, founded upon the Report, be addressed to the Secretary of State and the Erith Local Board of Health in reply to their communications on the subject. Also recommending that the Engineer and Chemist be authorised to incur the working expenses necessary for the treatment by precipitation, &c., of nine millions of gallons of sewage daily at Crossness, such expenditure not to exceed the sum of 7,000*l.*; and that the necessary wooden tanks, &c., required for deodorising purposes be erected at various points on the lines of main sewers within the metropolis, at a cost of about 1,000*l.*——At the last meeting of the Board, Mr. Fardell called attention to the subject, on the ground of urgency, in view of the approaching summer; but for presuming to suggest that the Committee might at any rate report piecemeal, like some Royal and Parliamentary Commissions, he raised quite a hornet's nest about his ears, although, as a sympathiser suggested, his only desire was to "oil the wheels" of the Committee, and, consequently, to accelerate their motion. At the same meeting of the Board, the further consideration of the Report of the Special Purposes and Sanitary Committee on the Cleansing and Ventilation of Sewers, already noticed by us, was again deferred for a period of six weeks.

Relief to the Unemployed.— Owing to the prevailing distress Messrs. Perry & Co., builders, Tredegar Works, Bow, have inaugurated an unemployed relief fund, which is to last several weeks. Their *employés* have responded liberally to it, the firm adding their weekly contribution. A number of cases have been investigated by the committee appointed, the result being that relief is afforded expeditiously.

Sanitary Institute of Great Britain.—The Autumn Congress and Health Exhibition of this Institute will be held in the City of York in September next.

Royal School of Mines.— Professor Warington Smyth, F.R.S., in concluding his lectures on mining, in the theatre of the Geological Museum, Jermyn-street, said, there can now be no doubt that the Newcastle roads, as the tramways were called, were in use long before the introduction of iron rails, wooden beams being employed; the wear and tear of these soon caused them to lay an iron plate on the top. About the same time, Mr. Curr, of Sheffield, proposed various improvements in underground transport. Among these was the laying down of tram plates,—a simple iron plate with a flange to it,—which was so great an improvement that one horse could then draw several carriages. The rails were first of a very simple character, merely a bar of iron let into a slot; on these broad wheels run, but the wear is so considerable that where there is a large amount of material to be carried the rails approach to the kind in use on surface railways. Nothing, perhaps, is more frequently employed on mining railways than the bridge rail so familiar on the Great Western Railway; the T-headed rail and the double T-headed are also sometimes used; while another form often adopted is that of a T-rail, with a broad base, in which are a number of holes for spiking it down. These rails weigh 12 lb. to 15 lb. to the yard, or, where special strength is required, as much as 25 lb. A common gauge for underground mining railways is 2 ft., in other cases 18 in., while in others again, as in the ironstone mines of the North, where they work with large quantities of timber, it may be only 12 in. In conclusion, the lecturer took occasion to impress upon the students the necessity in all mining operations of a thorough knowledge of geology and mineralogy, by which, on the one hand, we learn to recognise what are the best districts in which to search for mineral, and, on the other, to recognise the minerals themselves, as also those with which they are usually associated, and particularly in order to determine what is the relation between two sets of rocks.

Housing the Working Classes.— The nineteenth annual general meeting of the Artisans', Labourers', and General Dwellings Company, Limited, was held on Tuesday, the 9th inst., Mr. Ernest Noel, M.P., presiding. The report showed that the rental for the year 1885 amounted to over 90,000*l.*, the net revenue being 61,494*l.*, out of which interim dividends upon the preference and ordinary capital, amounting to 28,621*l.*, had been paid. It was now proposed to pay a dividend of five per cent. on the ordinary share capital for the second six months of the year, carrying over 4,000*l.* to revenue reserve, and 1,141*l.* to next year's accounts. The increase of capital during the year had been 62,450*l.*; the total amount paid up to 31st of December was 1,234,310*l.*, the authorised capital being 1,000,000*l.* in ordinary shares, and 750,000*l.* in preference shares 4½ per cent. The completed estates of the company in London are Shaftesbury Park, S.W., and Queen's Park, W., comprising nearly 3,400 separate houses. At Noel Park, N., the new estate of the company, work had progressed so that at the close of the year 974 houses were completed, 680 being let and occupied. This estate when completed will comprise 2,600 houses. The directors have acquired a good site of over an acre in Lisson-grove for the purpose of erecting block-buildings as dwellings for the Industrial Classes. The report and accounts having been adopted, and the dividend of five per cent. declared, the retiring directors and auditors were re-elected, and a vote of thanks concluded the proceedings.

Tunbridge Wells Water Supply.—In the *Builder* for the 19th of December last, p. 875, we reported the completion of the new storage reservoir at Pembury, and printed the speech of the engineer (Mr. Brentnall) describing the work, in which there were some departures from ordinary practice in carrying out such undertakings. We are sorry to learn from the *Tunbridge Wells Gazette* that a month ago it was discovered that there was a leakage in the reservoir, and, on the reservoir being emptied, several cracks were found in the asphalte forming the bottom of the reservoir.

A Knighthood for an Engineer.—It is stated that the Queen has signified her intention to confer the honour of knighthood upon Mr. Charles Douglas Fox, of Coombe Springs, Kingston-on-Thames, in connexion with the engineering work of the Mersey Tunnel.

Gift to the Wolverhampton Art Gallery. The *Wolverhampton Chronicle* announces that a fine gallery picture has been offered to the town through his Worship the Mayor, by Mr. Councillor Ross. It is the work of John Wilson, sen., R.S.A. The subject is a stormy sea seen from a wild shore near the Bass Rock.

PRICES CURRENT OF MATERIALS.

TIMBER.	£.	s.	d.	£.	s.	d.
Greenheart, B.G. ....ton	6	0	0	7	0	0
Teak, E.I. ....load	12	10	0	15	0	0
Sequoia, U.S. ....foot cube	0	2	4	0	3	0
Ash, Canada ....load	3	0	0	4	10	0
Birch „	3	0	0	4	10	0
Elm „	3	10	0	4	15	0
Fir, Dantsic, &c.	1	10	0	4	10	0
Oak „	3	0	0	5	0	0
Canada	5	10	0	6	10	0
Pine, Canada red	3	0	0	4	0	0
„ yellow	3	0	0	5	0	0
Lath, Dantsic ....fathom	3	10	0	5	0	0
St. Petersburg	4	0	0	6	0	0
Wainscot, Riga....log	2	15	0	4	10	0
Odessa, crown	3	12	6	3	15	0
Deals, Finland, 2nd and 1st...std. 100	7	10	0	8	10	0
4th and 3rd	6	0	0	7	10	0
„	6	0	0	8	0	0
Riga	9	0	0	14	0	0
St. Petersburg, 1st yel.	7	0	0	8	15	0
„ 2nd „	7	0	0	10	0	0
„ white	6	0	0	15	0	0
Swedish	7	0	0	17	10	0
White Sea	17	0	0	30	0	0
Canada, Pine 1st	12	0	0	17	0	0
„ 2nd	6	0	0	10	0	0
„ 3rd, &c.	8	0	0	11	0	0
„ Spruce 1st	5	0	0	7	10	0
„ 3rd and 2nd	5	0	0	7	0	0
New Brunswick, &c.	4	0	0	12	0	0
Battens, all kinds	0	9	0	0	13	0
Flooring Boards, sq. 1 in.—Prepared, first	0	7	6	0	8	6
Second	0	5	0	0	7	0
Other qualities	0	0	3½	0	0	4
Cedar, Cuba....foot	0	0	3	0	0	4
Honduras, &c.	0	0	2½	0	0	3
Australian	0	0	5	0	0	7½
Mahogany, Cuba	0	0	5	0	0	7½
St. Domingo, cargo av.	0	0	3½	0	0	4½
Mexican „	0	0	4	0	0	6½
Tobasco, cargo av.	0	0	4½	0	0	6½
Honduras, cargo av.	0	0	6	0	0	8
Maple, Bird's-eye						

TIMBER (*continued*).	£.	s.	d.	£.	s.	d.
Rose, Rio ....ton	7	0	0	10	0	0
Bahia	6	0	0	10	0	0
Box, Turkey	5	0	0	18	0	0
Satin, St. Domingo ....foot	0	0	7	0	1	0
Porto Rico	0	0	8	0	1	3
Walnut, Italian	0	0	4	0	0	5
METALS.						
IRON—Pig in Scotland ....ton	1	19	7	0	0	0
Bar, Welsh, in London....	4	15	0	5	0	0
„ „ in Wales	4	7	6	4	10	0
„ Staffordshire, London	5	15	0	7	0	0
Sheets, single, in London....	7	10	0	9	0	0
Hoops „	6	5	0	7	5	0
Nail-rods „	5	15	0	7	0	0
COPPER—						
British, cke. and ingt. ....ton	43	10	0	44	0	0
Best selected	44	10	0	45	0	0
Sheets, strong....	50	0	0	0	0	0
„ India	48	0	0	48	10	0
Australian	45	0	0	46	0	0
Chili, bars	41	17	6	42	5	0
YELLOW METAL....lb.	0	0	4½	0	0	4½
LEAD—Pig, Spanish	13	5	0	0	0	0
English, com. brands	13	15	0	0	0	0
Sheet, English	14	10	0	14	12	6
SPELTER—						
Silesian, special ....ton	14	17	6	15	2	6
Ordinary brands	14	10	0	14	15	0
TIN—						
Banca	0	0	0	0	0	0
Billiton	0	0	0	0	0	0
Straits	92	10	0	94	0	0
Australian	92	17	6	0	0	0
English ingots....	98	0	0	0	0	0
ZINC—						
English sheet ....ton	17	0	0	17	15	0
OILS.						
Linseed ....ton	20	12	6	21	2	6
Cocoanut, Cochin	29	0	0	30	0	0
Ceylon	26	0	0	0	0	0
Copra....	0	0	0	0	0	0
Palm, Lagos	0	0	0	0	0	0
Palm-nut Kernel	23	10	0	0	0	0
Rapeseed, English pale....	23	5	0	23	10	0
„ brown	21	15	0	0	0	0
Cottonseed, refined	17	0	0	18	10	0
Tallow and Oleine	25	0	0	40	0	0
Lubricating, U.S.	6	0	0	10	0	0
„ Refined	8	0	0	13	0	0
TURPENTINE—						
American, in casks....cwt.	1	9	6	1	10	3
TAR—Stockholm ....barrel	0	19	0	0	19	6
Archangel....	0	12	0	0	12	6

CONTRACTS AND PUBLIC APPOINTMENTS.

Epitome of Advertisements in this Number.

CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
New Premises....	Portsmouth Y. M. C. A.	C. W. Bevis	March 17th	xiii.
Jobbing Sewers Works	Mile End Vestry	*Official*	do.	xviii.
Asphalte Paving and Concrete	Vestry of St. James's, Westminster	do.	March 18th	xiii.
Wood Paving and Concrete	do.	do.	do.	xiii.
Street Watering....	Vestry of St. Martin-in-the-fields....	H. Jacques	do.	xiii.
Street Cleansing and Dust Collecting	do.	do.	do.	xiii.
Navy Contracts	Admiralty	*Official*	March 19 to 30	ii.
Supply of Building Materials	H.M. Convict Prisons	do.	March 20th	ii.
Works and Materials	Hornsey Local Board...	T. De Courcy Meade ...	March 22nd	ii.
House and Shop, Cambridge Heath	Mr. Burrows....	....	do.	xviii.
Rebuilding Premises, Queen Victoria-street ...	....	Banister Fletcher	do.	xviii.
Drainage Works....	Cromer Local Board ...	J. C. Melliss	do.	xviii.
New Streets Works	St. Giles's, Camberwell	*Official*	do.	xviii.
Ballast	Gen. Marine Land Co.	E. C. Homer	March 23rd	xviii.
Street Watering....	Strand Board of Works	*Official*	March 24th	xiii.
Asphalte Footway Pavements	Com. of Sewers....	do.	March 26th	ii.
Wood Pavement....	do.	do.	do.	ii.
New Police-Station	County of Suffolk	F. Whitmore....	March 29th	xiii.
Sewerage Works	Colne and Marsden L. B.	H. Bancroft	do.	xviii.
Tower Bridge.—Contract No. 1	Bridge House Est. Com.	J. W. Barry	do.	ii.
Sewerage Works, &c.	Com. of Sewers, Lincoln	H. L. D. Marsden	April 1st	xviii.
Arthur-street East Extension	Com. of Sewers....	*Official*	April 2nd	ii.
Works, Repairs, and Materials....	War Department....	....	do.	ii.
Well Sinking, Southwold....	....	Smith & Austin	April 5th	ii.
Broken Granite	Ramsey Local Board ...	*Official*	do.	xviii.
Clothing Factory, Stroud	....	H. A. Cheers....	Not stated	xviii.
Works and Materials	War Department....	*Official*	do.	ii.
Repairing Six Houses	....	....	do.	ii.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
Building Surveyor....	Eastbourne Corporation	156*l.*	March 22nd	xvi.
Deputy Executive Engineer	Bombay Municipality...	800 Rupees Monthly	March 23rd	xvi.
Assistant Surveyors	Civil Service Com.	Not stated	March 29th	xvi.

TENDERS.

BRIXTON.—For alterations and additions to 1 and 2, Exchange-buildings, Brixton-road, for Mr. A. Philps. Mr. J. W. Stevens, architect, New Bridge-street:—

Salter	£237 10 0
Pack Bros....	192 0 0
Lamprell (accepted)	172 0 0

BROMLEY (Kent).—For additions at "Woodlands," for Mr. T. A. Mitchell. Mr. E. Newton, architect:—

W. Adcock	
Maides & Harper	£1,588 0 0
J. C. Arnaud & Son (accepted)	1,434 0 0
Lowe (withdrawn)	1,429 0 0
	1,337 0 0

BUCKHURST HILL.—For the erection of shops, Queen's-road. Mr. E. C. Homer, surveyor, Mansion House Chambers:—

Dixon & Co. (accepted)....	£3,600 0 0

CLAPTON.—For the erection of three shops at Hill-street, Upper Clapton, for Mr. Andrew Hart. Mr. Jno. Waldram, architect. Quantities supplied by Mr. H. J. Treadwell:—

Munday & Son	£2,650 0 0
J. B. Axford	2,574 0 0
Morter	2,447 0 0
Ansell	2,400 0 0
Shurmur	2,373 0 0
Grover & Son....	2,137 0 0
J. Hicks	2,131 0 0

[Architect's estimate, £2,185.]

CROYDON.—For additions to the Public Baths, for the Corporation of Croydon. Mr. Thos. Walker, Borough Engineer. Quantities by Mr. Robert Ridge, Katharine-street, Croydon:—

Gregory & Findley	£1,100 0 0
Graves & Co.	1,075 0 0
Holloway....	995 0 0
Barton	985 0 0
Genny	962 0 0
Dickenson	948 0 0
Waller	947 0 0
Bryan	926 0 0
Page	925 0 0
Maides & Harper	917 0 0
Deacon....	875 0 0
Smith & Bulled	859 0 0
Sanders	830 0 0
Roberts	825 0 0
G. N. Wyatt & Co. (accepted)....	777 0 0

FRINTON.—For drainage in Field-road, Frinton, near Clacton-on-Sea. Mr. E. C. Homer, surveyor, London:—

Dixon & Co.	£445 0 0
N. Waterman	380 0 0
W. G. Gillingham	343 0 0

FULHAM.—For stables, &c., Star-lane, Fulham. Mr. B. J. Capell, architect:—

Scrivener & Co....	£2,588 0 0
Holliday & Greenwood	2,233 0 0
W. Shurmur	1,998 0 0
Catmur....	1,955 0 0
Jackson & Todd....	1,847 0 0

HADLEY WOOD.—For six houses on the Beech Hill Park Estate. Mr. Edwin T. Hall, architect, Moorgate-street:—

Foster & Dicksee, Rugby	£7,(50 0 0

HIGHGATE.—For the erection of chancel end to St. Augustine's Church. Mr. J. D. Sedding, architect, Oxford-street. Quantities by Messrs. Nixon & Raven, Westminster:—

Aviss....	£4,771 0 0
J. & J. Greenwood	4,370 0 0
Mowlem & Co.	4,153 0 0
Bone....	3,889 0 0
Dove....	3,825 0 0
Stimpson & Co....	3,630 0 0

ISLINGTON.—For rebuilding Nos. 511 and 513, Liverpool-road, Islington, for Mr. T. Yardley. Messrs. George Carter & Son, architects, Holloway-road:—

Riches & Mount, Battersea	£1,308 0 0
Parker, Peckham....	1,190 0 0
Haines, Harrow....	1,123 0 0
Garrud & Son, Hackney-road*....	953 0 0
Boreham, Bride-street	940 0 0

* Accepted.

ISLINGTON.—For the extension of shop and stables for Mr. J. Walkley, Elthorne-road. Messrs. George Carter & Son, architects, Holloway-road:—

Baker, Hornsey-rise	£443 0 0
Beaves....	312 0 0
Norris & Luke (accepted)....	261 0 0

LONDON.—For making certain alterations to No. 87, Leadenhall-street, City, for the Egyptian Cigarette and French Government Tobacco Company. Mr. H. I. Newton, architect, Queen Anne's-gate, S.W.:—

Cook....	£441 0 0
Godden	435 0 0
Burman & Sons....	425 0 0
Bryant (accepted)	374 0 0

LONDON.—For painting, repairs, &c., at the Public Baths and Washhouses, Endell-street, St. Giles', W.C. Mr. J. Waldram, surveyor. Quantities not supplied:—

	Painting, &c.	A.	B.
Ansell	£1,162	£60	£25
Hensman....	724	15	20
Styles & Son	698	18	Nil.
Sykes & Son	665	14	10
Munday & Son	635	38	33
J. Hicks	620	25	Nil.
Gover & Son*	615	19	30
J. B. Axford†	520	17	10
Surveyor's estimate	659	30	20

* Accepted. † Withdrawn.

A.—Add if front elevation is repaired and coloured.
B.—Add if indestructible enamel paint throughout.

LONDON.—For the erection of a 2-h.p. "Otto" gas-engine, pumps, &c., at the Workhouse, Poland-street, W., for the Guardians of the Westminster Union. Mr. Jno. Waldram, engineer:—

Z. D. Berry & Sons....	£355 0 0
Crossley Bros., Limited....	338 0 0
Merryweather & Co....	330 0 0
Shand, Mason, & Co.	298 0 0
Wilkinson (late Best & Co.)*	285 0 0

* Accepted.

LONDON.—For works at the City of London Brewery Mr. J. Jewhurst, architect:—

Langmead & Way	£595 0 0
Canning & Mullins	549 0 0
W. Shurmur	495 0 0
Wontner Smith....	489 0 0
Burch & Co.	475 0 0
Dixon & Co.	462 0 0
Spencer & Co.	450 0 0
Jackson & Todd	449 0 0

LONDON.—For the erection of premises for the London and Provincial Banking Company. Mr. Horace Cheston, architect:—

T. Boyce	£3,690 0 0
C. Conder	3,389 0 0
W. Shurmur	3,393 0 0
Paine Bros....	3,330 0 0
J. Morter....	3,300 0 0
Lawrance & Son....	3,117 0 0
M. Taylor	3,(0) 0 0
W. Shepherd	2,960 0 0

LONDON.—For building a new dining saloon at the rear of 25, Chapel-street, Edgware-road, for Messrs. Reggiori Bros. Mr. Robert Willey, architect, Ludgate-hill:—

Marks	£940 0 0
Rhodes	820 0 0
Penny & Durrant	757 0 0
Turtle & Appleton	675 0 0
Jones & Sons (accepted)	590 0 0

LONDON.—For rebuilding No. 374, Euston-road. Mr. Robert Willey, architect, Ludgate-hill:—

Larter & Sons	£1,600 0 0
Woodward	1,500 0 0
Rhodes (accepted)	1,455 0 0

LONDON.—For works at the Marquis of Anglesea public-house, Devonshire-street, Lisson-grove. Mr. R. A. Lewcock, architect, Bishopsgate-street:—

Pewtering, Counter, &c.

Heath	£266 0 0

Gasfittings.

Winn	98 0 0

LONDON.—For works at the Jolly Butchers, 261, Old-street, E.C. Mr. R. A. Lewcock, architect, Bishopsgate-street:—

Counter and Pewtering.

Heath	£213 0 0
Nicholls	212 8 6
Paddon, jun.	173 0 0
Williamson	161 0 0

Gasfittings.

Vaughan & Brown	74 12 8
Winn	73 0 0
Steadman	71 6 0
Hodge & Co.	70 4 6
Christian	69 17 0
Price	64 9 0

NEWPORT (Mon.).—For infants' school, boundary-walls, office, &c., at Panteg, for the Llanvrchava Upper School Board. Mr. E. A. Lansdowne, architect. Quantities by the architect:—

T. Foster, Abergavenny	£1,350 0 0
Jones & Co., Gloucester	1,126 0 0
W. Linton, Newport	1,095 0 0
Blackburne, Newport	1,092 0 0
C. Reed, Newport	1,045 0 0
G. Brind, Newport	1,040 0 0
H. Parfitt, Cwmbran	898 0 0
Jones & Son, Newport	878 10 0
Morgan & Evans, Pontypool	876 14 0
Wm. Price, Newport	874 9 0
J. Burgoyne, Blaenavon	859 11 0

NEWPORT (Mon.).—For proposed new church, Sailors' Home, and Institute, Temple-street, Newport (Mon.). Messrs. Habershon & Fawckner, architects:—

	A.	B.	Total
D. C. Jones & Co., Gloucester	£3,397	2,088	5,485
Wm. Church, Bristol	2,900	1,983	4,883
Stevens & Bastow, Bristol	2,919	1,920	4,839
Moulton & Brounscombe, Newport	2,899	1,923	4,822
David Davies, Cardiff	2,850	1,890	4,740
John Linton, Newport	2,799	1,870	4,669
Chas. Miles, Newport	2,720	1,791	4,511
W. M. Blackburn, Newport	2,693	1,795	4,488
Jones & Son, Newport	2,497	1,895	4,392
W. Price, Newport	2,619	1,694	4,313
	A.—Church and Institute.	B.—Sailors' Home.	

RAMSGATE.—For alterations and additions to No. 15, Effingham-street, Ramsgate, for Mr. R. Hodgman. Mr. E. L. Elgar, architect:—

C. Horne	£320 0 0
W. H. Part	285 0 0
Newby Bros.	284 15 0
B. J. Cowell	275 0 0
T. Elgar	264 0 0
White Bros.	260 0 0
H. Bowman	248 0 0
W. W. Martin (accepted)	240 0 0

STOCKWELL.—For alterations to 49, Binfield-road, for Mr. R. Greening. Mr. J. W. Stevens, architect, New Bridge-street:—

Lamprell (accepted)	£234 0 0

UXBRIDGE.—For two cottages at Uxbridge, for Mr. Vagg (Bricks found). Mr. G. Eves, architect, Uxbridge:—

Hardy	£488 0 0
James	450 0 0
Hendey (accepted)	386 10 0

WOOD GREEN.—For St. Paul's Schools, for the Rev. G. B. Cox. Mr. C. G. Wray, architect. Messrs. Linsdell & Giffard, surveyors:—

Taylor	£1,225 0 0
Perry	1,177 0 0
Sykes	1,132 13 6
Williams	1,132 0 0
Bamford	1,075 0 0
Staines & Son	1,024 0 0
Woodward	965 0 0

YARMOUTH.—For concrete and granite footways, for the Great Yarmouth Urban Sanitary Authority. Mr. J. W. Cockrill, Borough Surveyor. Quantities by the Borough Surveyor:—

Black, Bradford	£4,339 0 0!
Robson, Snaresbrook	4,329 7 4
G. Walker, Leeds	3,960 5 5
Brunton, London	3,750 0 0
Stuart & Co., Edinburgh	3,610 19 10
Macleod & Co., Stratford	3,570 0 0
Cordingley & Sons, Bradford	3,463 0 0
McKay, Bradford	3,406 11 7
Marshall, Brighton	3,400 0 0
Barnard, Great Yarmouth	3,360 0 0
Etheridge, Harleston	3,225 0 0
Wilkinson, Newcastle	3,050 0 0
Curzon, London	2,694 9 9
Hall, Rugby	2,693 6 9
Hindley & Wood, Manchester	2,690 0 0
Lockwood, Manchester	2,498 0 0
Allison, Sunderland	2,449 0 0
Duffy & Sons, London and Great Yarmouth	2,367 16 2
Bray, Great Yarmouth	1,639 0 0!

[Borough Surveyor's estimate, £3,080.]

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